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PORTABLE-LAMP DESIGNS.

A careful examination of the better class of portable electric lamps now on the market discloses a refinement in glassware and metal fittings which was practically unknown a few years ago. The most exacting taste can find little to criticize among some of the products being displayed for the Christmas trade and the cost of these fixtures has a range which is nothing less than remarkable. Probably no single item in the furnishing of an attractive home sets the keynote of the establishment so well as does the portable fixture for living room, hall or parlor, and certainly no device better combines utility and beauty. If a better household present can be made than a portable lamp suited to local needs, suggestions are in order.

The great majority of these lamps leave little to be desired, but in some instances the amount of effort spent on the artistic problems of design has resulted in the neglect of a few practical points which may be touched upon in the interests of good service. It is almost always the case that a given portable will give the most effective service with a particular size of lamp. Fairly high watt consumptions are required in this field, where absorption of light necessarily accompanies the use of translucent shades, but at the same time it is poor policy to install wastefully large units in such fixtures on the strength of the purchaser's probable indifference to the size of his lighting bills. In the design of portables, as well as in making up stationary fixtures, it is desirable to work out the best sizes of lamps for a given size of shade or reflector and there is a real difference between good and poor selections of units for such work. Standard outlets fortunately permit the owner to change his equipment through fairly wide limits, but the careful designer will see to it that the best lamp sizes are applied when his product is ready for service and that where two 25-watt lamps will meet the conditions, two 60-watt units will not be sponsored by the retailer. A more accurate study of fixture dimensions, shade materials and lamp sizes is needed in some quarters.

There is a variation in lamp arrangement among portables which is natural and proper, but there is room for better work in some designs in the direction of doing away with the shadows of supporting metal structures, of placing lamps symmetrically in the shade, of providing against glare by careful proportions and adequate depth of bowls, pyramids and other inclosing devices, of making cleaning and renewals easy, and of centering the bulbs accurately in single-lamp portables. A flux of light proceeding from a central spot 2 or 3 inches

off center with respect to the shade is bound to be inefficiently dispersed. Then again, too much care cannot be taken by dealers in fitting portables for counter or window display with tungsten lamps, where these are the standard units, as they should be in general practice.

Not a few otherwise compelling and beautiful displays are seriously hurt by the careless installation of any old carbon lamp or mixture of units that happens to be handy about the store. Where a portable display runs in unit prices from $5 to $50 or higher it pays to equip every fixture with the best possible type and size of lamp. The designer cannot control the sizes placed in his outlets by the dealer and the user, but he can accomplish a good deal by sound engineering and by passing the word along as to the best combinations for a given equipment. We shall see more care along these lines in the future, for the public is growing more exacting and dealers are awakening to the importance of high-class service in the face of a broadening competition.

THE GENERAL VALUE OF ELECTRICAL TRAINING.

It falls to the lot of many graduates in engineering courses to work sooner or later in fields somewhat removed from their special lines of training when in college. As a result of this, the point is often raised by older people in talking with young engineering and particularly with electrical graduates, that time and energy must have been wasted in preparing for branches of scientific application removed from their present tasks. Now this misconception of the fundamental objects of technical education ought not to trouble the recipient of such queries, but it does sometimes cause a good deal of self-examination and not a few times leads to doubts as to the wisdom of having spent several years in hard study along special lines.

Looking simply at electrical courses of the best kinds, it is at once plain that these include a pretty broad curriculum. They aim to ground a man in fundamental principles first of all and train him in habits of reasoning, of concentration and power of initiative that shall enable him to solve the greatest variety of problems on his own feet and with the co-operation of others when his personal resources are exhausted. A little thought will convince the younger engineer that the training in mathematics, in physical science, in languages, economics and general chemistry which he received at school is a splendid foundation for a mental superstructure of the most diverse architecture. Supposing in his last year at school he did experiment upon the wave forms of alternators or design a high-potential transformer that was up to the top notch of efficiency, is it any cause for worry that today he is perhaps trying to sell gasoline engines on the frontiers of urban life, directing the business end of a supply house, teaching manual training in a high school, toiling in a factory office or writing feature industrial advertisements? Not a bit of it. A glance over the register of engineering school graduates shows an amazing diversity of occupations among those taking any given course, and the very diversity of electrical applications, the wonderful possibilities of the industry, simply throw open doors of opportunity to the alert and imaginative man which many with less thorough training would scarcely perceive or, at the most, hardly be capable of seizing with swift adaptability.

While a man is in school and in close touch with the fascinations of the engineering laboratory, the ramifications of occupation which start from the very door of the college do not seem so real as the technical problems of research and testing, of the designing board and the classroom. The lure of the specialist is strong and this is in no small degree the day of the expert—and yet, the world has a vast amount of work to be done which concerns itself with human relations, with commercial considerations, and with trained common sense. Therefore let no graduate of 1914 nor of any other year be dismayed because the work next in hand differs from that of his undergraduate imaginings; rather let him be glad that he had the good fortune to go through a course of training which certainly was designed to help him to think more efficiently and which sought to force into his youthful mind that profound grasp of fundamental principles without which broad success in life is impossible.

RATE REGULATION AND FRANCHISE VALUES.

Is the regulation of rates of public utilities in New Jersey by the Board of Public Utility Commissioners at an end? This question may be seriously considered in connection with the decision rendered last week by the New Jersey Court of Errors and Appeals in the case of the Public Service Gas Company, and reported elsewhere in this issue. This decision sets aside the rate established by the Board and affirmed by the Supreme Court on the ground that no definite allowance was made in the valuation of the company's property for the value of the franchise under which it is operating.

This decision leaves rate regulation in New Jersey in a state of chaos. It requires that the value of a franchise be included in the valuation of a utility property for rate-making purposes, yet does not indicate how such value is to be determined, does not indicate that the evidence in the present case shows a definite value for the franchise in question, and does not remand the case for a determination of this value from the available evidence, but simply sets aside the rate established by the Board. The larger part of the opinion handed down by the court is devoted to a demonstration of the fact that franchises in general possess value, but there is no discussion as to whether such value in the case of the appellant is more than nominal, or exists at all. The principal argument for the existence of franchise value is the fact that franchises are taxed, in spite of the fact that the state law taxing them does not base the tax upon a valuation, but upon the gross receipts of the company, and the same tax must be paid regardless of

franchise value and indeed even though a particular franchise might be appraised as of no value. To be logical in this matter the court should require that the entire valuation for rate-making purposes should be taken as the assessed valuation for taxing purposes, a course which would find few supporters.

That many utility franchises possess large commercial value no one will dispute. That such values depend largely upon the actual or potential income of the utility will also be admitted. This is generally reflected in the market value of the capital stock, since such value depends upon the dividends which may be expected, and these in turn upon the earnings of the company. The court intimates that such market values of securities are an indication of franchise value, yet refuses to subscribe definitely to such a statement in these words:

"We do not wish to be understood as laying down the doctrine that the value of the franchise is to be measured necessarily by the total market value of the outstanding capital stock and indebtedness, less physical valuation and development cost, because this would take no account of inflation of stock value; but if such market value added to indebtedness show an excess, such excess is at least evidential that where there are special franchises, such franchises have some substantial value in excess of the mere outlays for legal, advertising and other legitimate expenses in obtaining them."

We assume that the inflation of stock value here referred to is such as might be due to the manipulations of speculators and does not refer to a price above the original cost due to steady payment of dividends.

The learned judges do not seem to realize that their position in this matter leads inevitably to a repudiation of all rate reductions. For if securities have a present value based on present income (and the knowledge that the court will insist upon recognition of this value) and the difference between the capitalization of net income and valuation of other elements of the property is taken as franchise value, then the total valuation will require rates to remain as they are. The only exception to this will be where the rate of return assumed in rate-making differs from the rate actually existent in determining market values of stocks. Thus if investors are paying for stock a price determined from dividends on the basis of seven per cent, and the franchise is valued upon the basis of stock prices, and eight per cent is used by the rate-making authority as the proper rate of return, it would turn out that rates would have to be raised.

There are other remarks in this opinion which do not indicate a very deep study of regulation problems, in spite of the fact that a year has been taken in formulating the decision and opinion. Thus a rate of return is approved which involves regard for the risk and hazard of the investment, but at the same time it is suggested that this risk and responsibility should be recognized in the valuation. Regarding the prohibition in the Utilities Act of the capitalization of franchises, the court says: "This prohibition refers to the inclusion of a franchise valuation in the par value of capital stock, but does not affect its market value." In other words, it has no force, and the statement of the Supreme Court that "logically no allowance should be made for the value of the special franchise * * * where the state still retains the right to fix rates" is not agreed to. The upper court does not discern what was apparent to the Supreme Court, that any power to regulate rates is nullified by the stand taken by the Court of Errors and Appeals.

It should be borne in mind that the Board increased its valuation of the physical property of the utility by an amount equivalent to 30 per cent of this valuation in arriving at the total value of the company's property. All intangibles were included in this, but as the Board stated that only a nominal value was allowed for the franchise, and this value was not itemized in the summary, the upper court considered it had sufficient justification for setting aside the rate. Had the valuation not been itemized, it would seem that the opinion of the upper court would have had to be framed entirely differently.

At first sight it would seem that regulation of rates in New Jersey, except in minor matters involving only discrimination, has been brought to a standstill. Fortunately this decision is controlling only in one state, and is out of line with precedents already existing in certain other states. It is possible that it may be followed in other states, however, by reactionary judges who refuse to accept the modern policy of regulation, and who will link their state with New Jersey in forcing municipalities into utility operation for themselves in order to have some satisfactory method of controlling rates. Many leaders of public opinion already advocate the pathway of municipal ownership as the easiest method of control, and decisions like this add ammunition to their batteries. Such decisions are therefore deplorable from the side of private utilities in general, even though they redound to the financial benefit of the particular companies involved. In the end they lead to the economic malpractice of the duplication of existing utility properties by others municipally owned or controlled, loss to the investors in utility securities, and consequent loss of prestige and favor of the securities in other utility properties.

It is a pity that the national organizations of utility companies cannot weld their membership together in adopting policies that are for the common good and that will be followed even when disadvantageous to some individual member. It is safe to say that the action of the Public Service Company in urging its contentions for individual advantage to the uttermost legal limit in this case has aided in the ruin of other utilities, and may even prove a boomerang if the cities and towns in its territory should decide that the only effective answer is municipal competition.

Electrical Exports for October.

The following data regarding the electrical exports from the United States for the month of October are obtained from the monthly summary of foreign commerce issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C.

The total value of electrical shipments in October was less than 60 per cent of that of the corresponding month last year; it also was slightly lower than the total of September, but considerably higher than the figure of August, the first war month.

For the four classes for which numbers of articles shipped are reported, there were exported in October the following: electric fans, 428; arc lamps, 359; carbon-filament lamps, 38,293; metal-filament lamps, 229,168.

In the following table are given the detailed figures for the different classes for October of this year and of last year.

Articles—	October, 1914.	October, 1913
Batteries	$ 69,061	$ 53,078
Dynamos or generators.	131,286	245,569
Fans	6,684	26,582
Insulated wire and cables	144,906	304,561
Interior wiring supplies, etc. (including fixtures)	47,551	86,039
Lamps—		
Arc	9,846	2,820
Carbon-filament	4,625	23,715
Metal-filament	42,007	16,918
Meters and other measuring instruments	34,418	.....
Motors	229,605	411,784
Static transformers	40,655	150,838
Telegraph instruments, (including wireless apparatus)	9,454	3,910
Telephones	64,544	190,875
All other	660,150	999,726
Total	$1,494,792	$2,516,415

Street-Lighting Contract for Boston.

A new contract between the city of Boston and the Edison Electric Illuminating Company for the street lighting of that city for a term of ten years has been agreed to and signed, after several months' delay on the part of the City Council. The rates for furnishing the lamps and apparatus, except posts for incandescent lamps supplied from underground circuits, and the cost of supplying energy to the various types and sizes of units, are as follows:

Candlepower.	Fixed cost per year.	Running cost per lamp-hour, Cents.
Incandescent Lamps.		
40	$10.80	0.25
60	12.00	0.3
80	14.00	0.4
100	18.00	0.5
200	25.00	1.0
320	36.00	1.5
400	42.00	1.6
Arc Lamps.		
425-watt A. C.	36.00	1.5
500-watt Magnetite	36.00	1.6
500-watt Thoran	42.00	3.2

The fairness of these rates is to be decided upon at once by the Gas and Electric Light Commission, and after five years this Commission shall again review the rates and may fix new prices to run during the next five years. The city may at any time employ an expert to test the currents and apparatus. In case two tests of any circuit or lamp are made within one hour and both tests prove that the required service is not being rendered, the units tested shall be deemed outages, to be discounted for at the rate of one cent per hour for lamps of 100-candlepower and less, and five cents for larger units. The company in such cases is to pay the cost of the tests.

Other conditions of the contract were given tentatively in the last issue, page 1129.

The new contract effects a saving of about $75,000 a year over the terms of the last contract, which expired in April. Though the terms of the new contract specify that it shall go into effect on acceptance by both parties, the previous rates holding meanwhile, the Edison Company voluntarily accepted the suggestion of the Council that the new contract be practically ante-dated July 1, thereby effecting a saving to the city of $32,652.66, which will be refunded by the company. The total amount involved in the new agreement is about $500,000 a year.

Philadelphia Section Meeting.

The December meeting of the Commercial Branch of the Philadelphia Section of the National Electric Light Association was held in conjunction with the Meter Department Branch on December 4. The evening was termed "Hot and Cold Night." The papers discussed were in relation to heating and refrigeration. The paper on "Electric Furnaces" as read by Mr. Crosby, of Detroit, at the Sales Managers' Convention at Association Island last September was discussed.

All uses of electricity for developing heat were referred to, but the subject of electric furnaces was given special attention. The various kinds were mentioned, analyzed and compared, and much valuable information developed. The subject was handled by J. D. Israel, R. L. Lloyd and C. J. Russell, of the local organization; and by Carle H. Booth, from Chicago, who gave special information in reference to the Snyder furnaces.

For the "cold" subject, refrigeration as applied to domestic sizes of machines only, was touched upon, and the present status of the art was intimately gone into. The consensus of opinion seemed to be that a thoroughly practical household machine must conform to the following requirements: lower first cost, adaptability, flexibility, noiseless operation, simplicity, automatic regulation. This subject was presented by J. D. Israel, and discussed by R. L. Lloyd.

Following adjournment, the Entertainment Committee had provided a "Hot and Cold" repast of fried oysters and chicken salad, coffee and ice cream.

Industrial Exposition to Be Held in New York.

The "Made in the U. S. A." Industrial Exposition to be held in the Grand Central Palace, New York City, March 6 to 13, will embrace a complete and diversified exhibition and demonstration of American-made goods and American-grown products in nearly all fields.

Special campaigns will be conducted to augment the number of buyers visiting New York at the time of the exposition. These campaigns will include the work of several important export and other organizations to bring foreign buyers from South America and other countries.

The exposition will be held under the auspices of a committee of leading manufacturers and merchants and its management is in the hands of Harry A. Cochrane, with executive offices in the Fifth Avenue Building, New York.

The Industrial Exposition is designed to answer a two-fold purpose of value. It is not only to stimulate American trade to domestic and foreign buyers, but to educate the American consuming public to our resources and show, particularly, goods that can be obtained from our manufacturers that the American people themselves have heretofore been obtaining from abroad.

Edison Plant at Orange, N. J., to be Rebuilt at Once.

Part of the Edison phonograph works at Orange, N. J., was destroyed by fire on December 8. The private laboratory of Mr. Edison and the buildings of the Edison Storage Battery Company and the Edison primary battery department were not affected at all. The business of both battery departments will continue as usual, and as large quantities of diamond disc phonograph records were saved, that business will go on as usual.

Mr. Edison announces that although the loss has been very extensive, he has made arrangements for the immediate reconstruction of the destroyed property.

Louisville Jovians Arrange Meetings.

Beginning with Tuesday, December 22, the Jovians of Louisville, Ky., will inaugurate a regular system of meetings which provide for two each month, one a noon-day luncheon session on the first Tuesday in the month and the other an evening meeting on the third Tuesday in the month. Business will be more or less incidental at the first meeting but will be the sole purpose of the second meeting. The second meeting each month will take place in the employees' meeting rooms of the Louisville Gas & Electric Company.

Electricity in a Coal-Handling Plant.

By Robert M. Hale.

This article describes in a comprehensive manner the electrical features of a large western coal mine, using central-station energy, and gives interesting details relative to the conveying and handling by means of electrically driven equipment.

The properties and coal-handling plant of the Issaquah & Superior Coal Mining Company are located at the foot of Mount Issaquah, about one mile from the town of Issaquah, and 29 miles southeast from Seattle, Wash., on the Northern Pacific Railway.

In their early history, these mines were very prosperous and turned out many tons of coal; for some years, however, they have been abandoned and the workings allowed to flood. Alvo Von Alvensleben, of Vancouver, B. C., organized the present company, obtaining the capital in Germany, and in September, 1912, took over the old properties. The company now owns 1,600 acres of lands containing immense quantities of coal, and some valuable timber for mining purposes. The company has about 100,000 tons of coal blocked out, with about 50,000,000 more tons accessible.

No attempt has been made to pump out the old mine. A new tunnel has been driven into the side of the mountain above the water level, and is now about 6,000 feet long. This tunnel cross-cuts three large beds of coal which dip at an angle of 27 degrees, and lie like three blankets in the mountain. Two new beds of coal have been discovered, which heretofore were merely conjectured.

Two hundred and fifty-six feet higher up the mountain is another tunnel running nearly parallel with the lower one. At the mouth of this tunnel, is a gravity incline cable railway, by means of which the cars are lowered to the level of the lower tunnel. As the mining progresses, it is the intention to make several connections inside the mine between the tunnels and chute the coal down to lower or main gangway.

Development work was immediately started upon the acquisition of the property, and a small temporary washing plant was installed to care for the output of the mine. During the past year, 6,000 feet of main tunnel has been driven. The main tunnel is duplicated with parallel rock tunnel, and air circulation is maintained by five fans.

A central power-distributing station and compressor house, 48 by 60 feet was built near the entrance to the lower gangway. This building is intended to house all the compressors used around the mine. The roof is trussed so that all floor space is available. At present, there is only one large compressor in the house, but space has been left for another unit of the same size, in addition to three smaller ones now located in different parts of the mine. The extra space is now being used as a mine-rescue station, equipped with Draeger apparatus, and the latest

Electric Locomotive Inside of Coal Mine.

devices available for mine rescue work.

The new compressor is a duplex direct-connected motor-driven, Ingersoll-Rand machine. It is driven by a 300-horsepower, 2,300-volt synchronous motor, and has a piston displacement of 1,613 cubic feet of air per minute, with an actual guaranteed capacity of 1,380 cubic feet or an efficiency of 85.6 per cent. This machine has the hurricane inlet valves and the automatic clearance controller.

A 100-kilowatt motor-generator set was also installed in this building for generating the direct current necessary for driving the two eight-ton electric locomotives used on the lower gangway.

The Coal Company purchases all of its power from the Puget Sound Traction, Light & Power Company. It is delivered from the Issaquah substation of that company at 2,500 volts, three phase, 60 cycles.

Compressor House and Outdoor Substation.

Picking Tables—Motor-Driven Conveyors Used.

The engineers of the Coal Company went very thoroughly into the comparative costs of installing their own power plant, and buying electric energy, which is generated at water-power stations within a radius of a few miles. It was decided, as above indicated, that greater economy in operation and first cost could be had by purchasing power.

The maximum demand at this time is about 1,200 horsepower. A single three-phase, 2,300-volt feeder runs from the power company's Issaquah substation to the coal company's station, entering a main in-coming totallizing panel, and distributed from 2,300-volt busses, controlled from this panel. The switchboard consists of eight panels, as follows: Panel No. 1, main totallizing panel, equipped with three ammeters; one volt meter; one indicating watt meter; one integrating watt meter; one graphic recording watt meter; one eight-point volt meter receptacle, and one T. P. S. T. automatic oil switch. The instruments on this panel were installed by the coal company, and are intended for keeping its own records, the power company having its instruments mounted on a separate panel.

Panel No. 2 for the control of one 300-horsepower, 2,300-volt, three-phase, 60-cycle synchronous motor; one main ammeter; one field ammeter; one starting and running switch; one field switch; one power-factor indicator. This synchronous motor is self-starting and is direct-connected to the Ingersoll-Rand air compressor.

Panel No. 3 is a feeder panel taking care of two 2,300-volt, three-phase circuits, for the control of 260-horsepower capacity of motors in the upper mine working, and 300-kilowatt capacity in transformers for supplying the 2,300-volt equipment. Mounted upon this panel are two ammeters and two automatic oil switches.

Panel No. 4 controls the 2,300-volt side of a 100-kilowatt motor-generator set for supplying direct current to the mine railway.

Panel No. 5 controls the direct-current side of a 100-kilowatt motor-generator set.

Panels No. 6, 7 and 8 all control the 220-volt, three-phase, motor circuits. The busses from which they are distributed and energized, form the low side of the three 100-kilowatt transformers controlled from Panel No. 3.

In the design of this switchboard, great care has been exercised in putting in a safe equipment. For instance, between all oil switches on the 2,300-volt panels and the busbars are installed disconnecting switches which are mounted on steel frame work, directly above the panels that are fed through them.

In general, it might be thought that the switchboard equipment was a little elaborate for a coal-producing plant. The engineers for the coal company, however, rightly concluded that since current was being purchased on a maximum-demand basis, that operations in different parts of the plant could be so timed as not to have peak loads in several departments occur at the same time, the operator having his eye on the maximum demand at all times, and acting, in a sense, as a load dispatcher.

Feeder circuits run from the compressor house to the washing plant, which is about 500 feet distant, and at that point is installed a four-panel distribution switchboard, thoroughly equipped with automatic overload-release switches, and other protective devices for the controlling of the various motors and lighting circuits throughout the washing plant.

The motors throughout the washing plant are all protected with automatic overload-release relays, and no-voltage release type of compensators.

Only the very best construction was used throughout, all of the wiring being installed in conduit, and all 2,300-volt lines were in leaded cable.

The haulage system was laid out so that all grades would be in favor of the loads. The trains are made up in the different parts of the mine, and hauled to the main gangways by mules. On the lower level, they are here taken by the electric locomotives and hauled directly to the tipple. Inside the mine, the grade is one per cent, and from the mine entrance to the rotary dump, the grade is 1.4 per cent in favor of the loads. On the upper level, the trains are handled by a gasoline locomotive, and brought to the top of the gravity incline railway. Here they are made up into trains of four cars each, and let down to the lower level. At the foot of the incline, they are disconnected and pass by gravity onto the same tracks as those from the lower level. The grade is steep enough to require that the cars be spragged, and when these are removed, they will pass by gravity into the rotary dump, having a capacity of two or three cars per minute.

Before entering the dump, the cars pass over a tipple scale and are weighed in motion. The dump man operates the car stop, and the dump, and tallies each car on the board behind him. After the cars pass over the scales, they are brought to a standstill by the car stops, and held

there until the dump is clear. When the dump is clear, the released car passes down a three-per-cent grade into the dump; at the same time, another car,

Motor Driving Conveying Machinery in Tipple.

released above the scales, passes slowly over them, and comes to rest in the car stops. The loaded car entering the dump bumps the empty out, which then passes down a 11.5-per-cent grade, and is

Coal-Screening Machinery—Motor in Background.

switched to the foot of the incline car haul. The car haul lifts the empties 17.25 feet above the loads, from which point they run by gravity down a 1.4-per-cent grade to the lower tunnel entrance, or to the foot of the incline as desired.

Directly under the rotary dump is a large hopper, having a gate which can be opened when it is desired to by-pass rock, which comes from the mine in cars, directly to a refuse bin. A reciprocating feeder, regulating the feed of the coal, forms the bottom of this hopper, and feeds the coal onto a double shaking screen, from which it passes onto the picking tables.

The two shaking screens under the reciprocating feeder are so arranged that they permit of considerable variation of the product. It has been found that sometimes it is desirable to make a small washed egg coal, while at other times a larger hand-picked egg is preferable; in the latter case, the upper screen has 3.5-inch perforations, and the lower 2.25-inch perforations. All coal passing over the upper screen is delivered directly to the lump picking table, where it is picked by hand and the refuse thrown down chutes to the refuse conveyor. At the lower end of the picking table, the lump coal passes onto a loading boom which travels at right angles to the picking tables, and is loaded directly into cars on an adjacent track. The loading boom is raised and lowered by means of bevel friction gears, and practically eliminates breakage in delivery of lump coal into gondola cars.

All the egg coal, from 2.25 inches to 3.5 inches, which passes through the upper screen, but not through the lower, is delivered directly onto the egg picking table. Here it is picked by hand, and the refuse treated in the same way as that of the lump coal. At the lower end of this picking table, the egg coal can be delivered to the loading room, and mixed again with the lump, or it can be by-passed and loaded directly into cars on a track. The coal which passes through the lower screen, having 2.25-inch perforations, is delivered to a 600-ton raw-coal storage bin serving the washing plant. When it is desired to make a washed egg, the lower shaking screen plate can be removed, and new plates having three-inch perforations, put in the upper screen, thus making a lump coal from three inches up, while everything below three inches passes through the washery. When this is done, the egg coal-picking table is not operated, all picking being done on the lump table.

The raw-coal storage bin has a gravity discharge elevator passing over the top (under the shaking screens) which distributes the material in the bin, then passes down the outside of the bin and back under same, where coal can be delivered to it as desired. This elevator, after receiving the coal from the bin, on the lower horizontal run, turns and rises vertically 52 feet, turns again horizontally, and delivers the coal to a Parrish screen, where it is sized for washing.

This screen has 0.75-inch perforations, and delivers the coal to two smaller storage bins, from which it is fed directly to the jigs. That which passes through the screen, all under 0.75 inch, goes to a Foust jig, and after washing is made into pea and buckwheat coal. That which passes over the Parrish screen, or all over 0.75 inch, goes to a Shannon jig, and after washing is sized into egg and nut coal. The bin gates feeding the jigs are connected with the jig eccentrics which impart a constant up and down movement, thus insuring a continuous feed, and permitting a regulation of the capacity, as desired.

The refuse from the Shannon jig is

elevated and dumped into the refuse conveyor, under the picking tables and conveyed to the refuse bin. The washed coal is elevated in another elevator, and delivered to a double-deck screen, the upper screen having two-inch perforations, and the lower 0.75-inch. The upper screen is used only when it is desired to make a washed egg from 2 inches to 3 inches, this coal being delivered from the screen to a short flight conveyor and put into bins for delivery into cars, or it is by-passed back to the loading boom and mixed with the lump if desired.

There are two water systems in the plant, one the circulating water, or water which is used over and over again, and the other the fresh-water supply which is added through the sprays on the washed-coal sizing screens. The plant requires 60,000 gallons of water to fill the recovery tanks and jigs this being supplied by a three-inch direct-connected motor-driven centrifugal pump located on the creek bank. The overflow from all tanks is led to a pump pit, from which it is drawn out and sent through the circulating system, by a six-inch belted centrifugal pump.

All machinery in connection with the tipple and washing plant is driven by alternating-current 220-volt motors, the total rated horsepower of all the motors being 345, which gives ample margin over the actual power requirements.

Commercial Practice
Management, Rates, New Business

Artificial Ice Plants Operating in Conjunction with Small Central Stations.

The managers of central stations supplying small towns with electricity to a population of 2,500 adults or less, are at all times interested in promoting any manufacturing proposition which can utilize power at off-peak periods, thus increasing the daily load-factor. Herbert Hecheimer electrical and mechanical engineer, 602 Monadnock Block, Chicago, Ill., has compiled the following data bearing upon this subject:

An artificial ice plant offers the most attractive load for this class of service. During the summer months when the ice-machine load is greatest the lighting load is least and in the winter months when the ice business is dull, the lighting load is at a maximum.

For purposes of illustration, assume conditions in a town of 2,500 population, served by a 200-kilowatt generator operating on night schedule only. A town of this size will consume on an average 2,500 tons of ice yearly, the maximum daily demand for ice in summer amounting to about five tons, while the maximum daily demand in winter would amount to only two tons of ice.

The ice-making capacity should be sufficient to take care of the present maximum daily sales of ice in summer. Future growth of business can be taken care of by building an ice-storage house, storing up ice in the dull winter season and drawing from the store house in the busy summer season.

To manufacture five tons of ice in 24 hours, would require a total consumption of 250 to 300 kilowatt-hours, depending upon the season of the year and temperature of water required to serve the ice-making machinery, or in other words 50 to 60 kilowatt-hours for every ton of ice made. The maximum demand for power at any one period would be about 18 kilowatts for a five-ton plant or about 3.5 kilowatts for every ton of ice made, if the ice plant is operated 24 hours daily. If it is desired to operate ice machinery only 12 hours daily, the maximum demand would be double the above, although the total consumption would be about the same.

A plant built to make a certain quantity of ice to operate 12 hours daily will cost considerable more than a plant built to make the same quantity of ice, but operating 24 hours daily.

The refrigerating and ice-making machinery can either be installed in the engine room of the central station and belt-driven off the generator-engine shaft or located in a shed adjoining the central station. Conditions sometimes warrant a special engine to drive the ice-making machinery, and in that case a steam line can be run from the boiler room of the central station to the ice-machine engine. In some cases it proves more desirable to drive the ice-making machinery by individual motors, the station furnishing the current.

Artificial ice is superior to the natural product in every respect. Even in those localities where winter weather insures an abundance of natural ice, artificial ice is fast supplanting it. However, artificial ice must be clearer and purer than natural ice to find a ready sale. To produce transparent ice it is necessary to remove impurities and, peculiar as it may seem, air and other gases which are always in solution in water. If this is not done the ice will be opaque due to impurities, also due to air and gas bubbles frozen in. Cloudy ice would cause complaints from customers while clear ice would be a source of satisfaction.

There are two methods of making clear artificial ice:

First. By agitating the water obtained from a drinking-water supply during the freezing process. This is known to the trade as "Raw-Water Ice."

Second. By condensing exhaust steam, and removing oil, gases, etc., from the distillate by means of oil separators, etc., and reboiling the distillate to remove the gases in solution, then freezing the distilled water, without any agitation. This is known as "Distilled-Water Ice."

Whether a raw-water or a distilled-water system be installed depends upon the chemical constituents of the local water supply. There are certain grades of water which will never furnish a clear cake of ice unless chemically treated, while other waters are of such condition that chemical treatment will cost too much. In such a case, a distilling system is necessary to furnish a clear cake of ice.

A thorough chemical analysis and report by those versed in the mysteries of raw-water ice-making should be obtained before a central station decides upon a raw-water system. If the water is found to be satisfactory, it can be frozen into ice that is commercially perfect from all standpoints.

These small ice-making plants can be most profitably operated by the managements of the central stations themselves, due to the fact that the operating and office force of the station can also take care of the ice-making department. No extra investment is generally required for boilers and in some cases engines. A small ice-making plant run as an isolated unit and as a separate business would re-

quire its own boiler and engine plant and also its own operating staff. A central-station ice plant cuts down the manufacturing cost of ice, cost of labor and office expenses, and also fixed charges against the ice-making department. It also reduces the fixed charges against the generating station. A small plant of this nature can make ice to more than compete against larger ice-making plants or natural ice.

Small towns usually depend upon their ice supply by shipments from a larger ice plant or from a local ice dealer who may cut natural ice in winter from local ponds or rivers. These ponds and rivers are not always pure and are very often outlets for drainage.

The central station may find it profitable to deliver ice to the user, otherwise could sell its complete ice output to the local ice dealer. The local ice dealer would undertake the delivery of the ice. One horse and wagon can easily deliver five tons of ice daily. The application of the last idea would not antagonize the local ice dealer and would eliminate an accounting system.

Louisville Company Discontinues Sign Maintenance.

The Louisville Gas & Electric Company, which had been operating 97 electric signs for customers, supplying current on a flat rate, has disposed of this business to the Louisville Branch of the Federal Sign System.

Noteworthy Sign Installation in Cincinnati.

Electric signs are generally, and usually correctly, associated only with the very heart of the business section of a city; but their usefulness in advertising either the location of a business house or its product, independently of its location, is becoming so well appreciated that they are now found advantageously placed not only at points at considerable distances from the central business section, but even in the remote suburbs.

One of the most attractive signs in Cincinnati among those recently erected is located in one of the hill-top suburbs, Walnut Hills, at the busy suburban intersection known as Peebles' Corner. This is not a lonely spot, however, as probably a dozen or more car lines from the city pass it, and there are numerous business houses which bring shoppers from a radius of many blocks. The sign itself is visible from a distance of eight or ten blocks in two directions, to persons coming up from the city and to those going down, so that it has a circulation, so to speak, very nearly as large as any which could be placed anywhere except in the immediate heart of the city.

The sign was contracted for some time ago by the White Star Laundry Company, of Cincinnati, for use in connection with its Walnut Hills branch, which is located at the corner indicated. The Federal Sign System (Electric) constructed the sign, which is shown in the two accompanying illustrations.

Indicating the name of the concern which it advertises, the central feature of the sign is a great star, outlined in white lamps, and standing out well during the day, as it is painted white. The star is two feet at its greatest width. The sign itself is 14 by 12 feet. The most prominent words are "White Star Laundry," the two first appearing at the top and the last at the bottom, in 20-inch letters.

The star is placed toward the top of a flashing fire-pot design which furnishes the movement calculated to draw attention to the sign at night. It extends from the top to the bottom of the sign. The torch, the star and the words "White Star Laundry" are flashed on, then the flame of the torch appears, flickering in a very life-like manner, during which time the star and its rays "twinkle" and the words "Wash Up," in 14-inch letters, appear at the bottom. Then the whole sign is flashed off and the process begins again.

The background of the sign is painted black, while the lettering is yellow. The lights appear in the following colors: Flame, red; torch, green; star, white; rays, yellow; lettering, white. It may be easily understood from this that the sign has an exceedingly brilliant appearance when it is lighted. Four hundred lamps are used, of which 300 are 5-watt and 100 are 10-watt. The sign is suspended from the building at the third story by heavy chains, and steadied at the sides by guys.

Daylight View of Laundry Sign.

Sign Lighted.

Completion of 33-Mile Transmission Line in Minnesota.

A 33-mile electrical transmission line connecting the Minneapolis water powers with the Mankato and Cannon Falls water powers of the Consumers Power Company of Minnesota was completed and placed in service December 1. This line, which was constructed by the engineering department of H. M. Byllesby & Company, ties together five water-power plants with 36,500 installed electrical horsepower and six steam stations with a total of 29,500 horsepower. The increasing business of the Mankato and Faribault divisions of the Consumers Power Company had reached a point exceeding the capacity of the steam-reserve stations in these cities, and the transmission line just completed will permit the large steam reserve stations in Minneapolis and St. Paul to overcome the deficiency. The existing steam stations at Mankato and Faribault will be held in reserve for use in case of line trouble. The new transmission line runs from South St. Paul southward to Northfield, nearly paralleling the Chicago, Milwaukee & St. Paul Railway and will make electric service possible in a number of small towns and rural districts heretofore without this utility. The line is built to carry 60,000 volts pressure, but will be operated for the present at 33,000 volts.

Contracts for serving the electrical requirements of Garden City, Amboy and Vernon Center, Minnesota, have been closed, covering a period of 20 years. The combined population of these communities is approximately 2,500.

Activities in Pueblo.

The El Paso Consolidated Gold Mining Company is arranging to install a 150-horsepower hoist to use Arkansas Valley Railway Light & Power Company service, and will install a large compressor later. The United States Portland Cement Company has business contracted ahead which will require working two shifts a day until next March. During the week ending November 28 the Arkansas Valley Company's connected lighting load increased 120 kilowatts, a large part of this being the new white-way lighting system. The same week 207 flat irons and 31 other appliances were sold in the Christmas appliance campaign.

Cotton-Mill Contract.

The Louisville Gas & Electric Company has contracted with the Kentucky Cotton Yarn Company, recently organized to equip and operate a cotton mill, to supply the current for about 20 horsepower of motors.

Modern Merchandizing—Extending the Field at Yonkers.

Yonkers, like many suburbs, has been and probably will continue to be the butt of many jokes, humorous and otherwise. A suburb is not an easy place to work out new business problems as the advantage of metropolitan advertising and publicity are often outweighed by inability to put over local campaigns due to the apathy of the commuting public for things provincial.

In spite of the fact that over a third of the population is supported by New York commuters the evidences of civic pride are prominent and numerous, the City Hall would do credit to any city and the schools, library, etc., are of the same order.

Special Lighting in Yonkers.

It was not until 1900 that the revenue to the central station from the commercial load began to bring in more revenue than the public lighting. Since that time the community has grown very rapidly and the number of old unwired houses has been greatly reduced. The population now supplied numbers nearly 100,000 spread over an area of 22 square miles.

The company has always maintained a show room which ranked well for appointments as well as location, but the sales of appliances have been confined to irons. The most successful method of getting these on the lines has been by sending the irons to prospects by parcel post and left with them for 10 days on approval. During this period the saleswoman-demonstrator calls and endeavors to close the sale. By sending the irons through the mails it has been found that the prospect will accept them more readily than they would when delivered by the express company or by the company's employees.

Although countless current-consuming devices were displayed in the show room none were offered for sale, and Manager John P. Radcliff, Jr., tersely described the display method as a "passive" form of education which might lead to sales. Beginning last April the company has been selling all types of appliances charging any device of $10 or less in value upon consumers next bill. This method has the advantage of making a sale while the consumer is in a receptive mood. Not only are sales lost by not having goods for sale, but the time of connection may be delayed a month or two. Getting devices on the lines in the shortest possible time consistent with the cost of selling is the prime reason for a salesroom or a display room.

Goods have been sold without additional expense up to the present time and the next step will probably be the use of outside salesmen in addition to those employed on irons.

The office and show room of the Yonkers Electric Light & Power Company is located on Manor House Square, the business and civic center of the community, and whenever there is something going on the company will be found an active supporter. "Yonkers" day celebrated recently might be cited as an example. A baby parade in the afternoon and music and dancing in the evening were held in the square in front of the office, and the special illumination provided was one which the company is continually doing to "Boost Yonkers." The accompanying illustration shows the special illumination in the vicinity of the company's office during a celebration.

Electric Sign Data

Notable Christmas Sign.

The Boston department store of the Houghton & Dutton Company is signalizing the Christmas holiday season by the operation of a large and attractive electrically illuminated sign on the front of the building facing the junction of Beacon and Tremont Streets. This sign is illustrated herewith and forms the subject of the accompanying data. The structure is composed of white plaster-of-paris and represents a castle, with heroic figures in recesses, behind which is a red background. The central group represents Santa Claus driving four prancing reindeers.

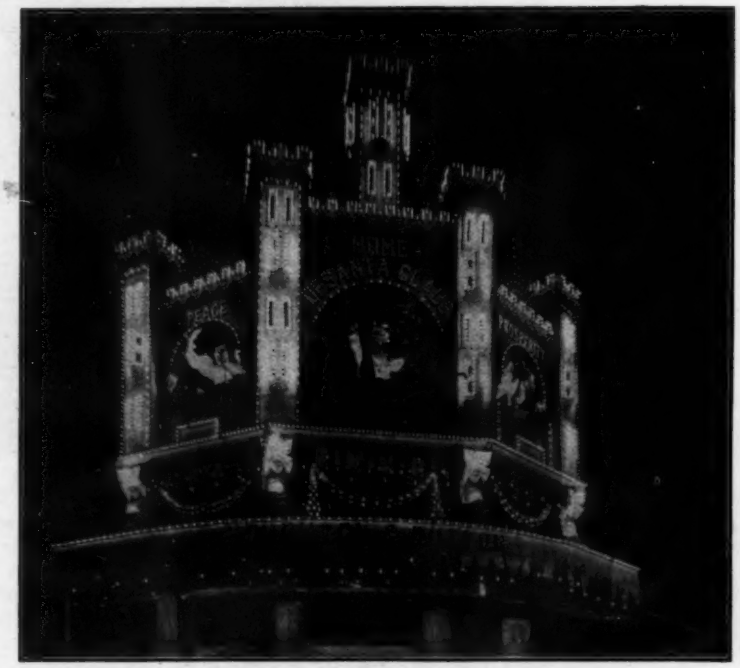
On one side is a figure of Peace and on the other side Prosperity, each attended by cherubs. A pendent fringe under the castle portrays snow. The whole edifice is supported by four giant Atlanses.

The electrical equipment consists of 4,100 20-candlepower carbon lamps and 25 250-watt Mazdas. The former units form an outline to the castle and its towers, and in a fan-shaped arrangement produce the effect of a red sunburst, one over each of the allegorical figures. The castle towers are outlined in white lamps above and a border of green lamps below. These rows are given an alternate lighting at 10-second intervals by means of a Betts & Betts flasher having 48 fingers and operated by a one-quarter-horsepower motor. The white "icicle" lamps are operated, to give a "dripping" effect, through a shop-made flasher driven by a one-half-horsepower motor, while the same flasher, through another set of finger connections, produces the sunburst effects. The lighting of the lamps in these groups begins at the base and runs to the top, the lower lamps remaining lighted until all the lamps above have been lighted in succession, and then all remaining lighted for about five seconds.

A room in the building back of the sign is given over to the electrical apparatus. A special illuminating panel board carrying 100 circuits for the sign is installed here, together with the flashers and motors. Energy is supplied through a substation for store lighting and power, in the basement, by the Edison Electric Illuminating Company of Boston, the sign lights being operated on 110 volts.

The firm name is in outline of red lamps operating constantly, while the 250-watt Mazda lamps referred to are for the purpose of lighting up the groups of figures. Of these large units, three in front of each group are equipped with glass mirror reflectors which throw the light up onto the figures from locations below the groups.

The lamps for the castle outline are inserted in receptacles installed in wooden strips which are fastened to the face of the plaster structure.



Spectacular electric Christmas sign, erected by the Houghton & Dutton Company of Boston, Mass. Sign was designed and executed by Hugh Cairns of Boston. Electrical equipment was devised and installed by G. L. Callahan of Houghton & Dutton store.

There are 4,100 20-candlepower carbon lamps and 25 250-watt tungsten. Complete data on operation and construction are given in accompanying text.

At a hearing before a special commission on the question of legislation looking to the taxation of signs in Massachusetts, Sheldon E. Wardwell, counsel for the Massachusetts Lighting Association, opposed the general proposition of imposing a tax on constitutional grounds. He held that any measure of the sort would be an infringement of personal right to the use and enjoyment of one's property.

Mr. Wardwell pointed out the large use of the advertising signs on the part of cities in connection with local business boosting.

It was stated that the Boston Industrial Development Commission is to use large electrically lighted signs beside railroad tracks leading into Boston, to advance the city's commercial interests.

An electric sign display of more than passing interest is being arranged for at San Diego, Cal., in connection with the Exposition. The sign board will be 48 feet high and contain the wording, "San Diego, First Port in California." The lower section will be devoted to "business signs.

Electrical Construction

Idaho Construction Rules.

Power and light men in all parts of Idaho are greatly exercised over the proposed rules to be adopted by the Public Utilities Commission to govern all overhead line construction by power, light, telephone, telegraph and railroad companies. On December 4 and 5 there was a meeting in Boise City of the members of the Executive Committee of the Idaho Power & Light Association, together with engineers of a number of the larger companies, lawyers, and others especially interested. The matter under discussion was the nature of the proposed rules.

In July last there was a hearing before the Public Utilities Commission on this matter. At that time the different interests involved failed to agree. The power and light men insisted that the rules proposed by the telephone companies, especially, were so drastic in many of their provisions that they would raise the cost of construction for transmission and distribution lines to such a point as to make it practically impossible for the power and light companies to get out into the rural communities, and that they would drive the power and light companies off the streets and highways in many places and compel them to purchase private right of way at enormous cost in some cases. Because the representatives of the different interests failed to agree, the Commission postponed action in the matter until January 11.

A statement was made as follows:

"The power and light men wish to be placed on record as favorable to rules of such character as will provide for construction safe to employees and the public. Such rules will permit these companies to go ahead with their development and extension work and bring into active production much of the territory that is now lying dormant."

Oregon Electrical Contractors Meet.

The Oregon Electrical Contractors' Association met at Albany, Ore., on December 8 and 9. There were about 75 members present. A business session was held on Wednesday at the Hotel Albany. On Tuesday evening there were social features, including a bowling contest between contractors and jobbers.

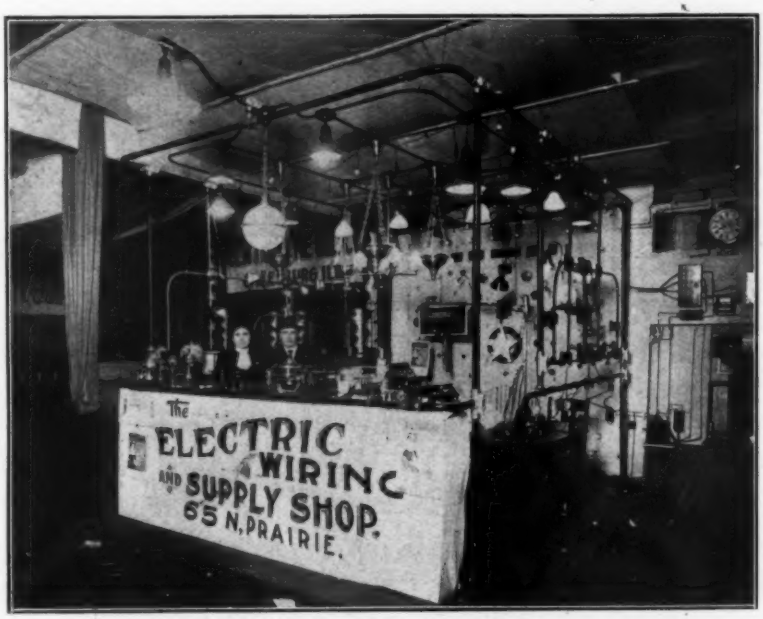
A Contractor's Exhibit.

The value of participation by electrical contractors in electric shows or other exhibitions depends largely upon the way in which the matter is handled, how the exhibit is arranged, and how it is attended.

The accompanying illustration depicts an exhibit which was arranged by R. L. McLaughlin, of Galesburg, Ill., who participated this year in a show which was devoted principally to other interests. Nevertheless the display of electric novelties, lamps, fixtures, and household appliances arranged by Mr. McLaughlin attracted much attention. Not only were current-consuming devices tastefully displayed for the inspection of visitors, but a booth was built up from conduit and fittings which formed a pleasing departure from the general appearance of neighboring exhibits. From these conduits fixtures were suspended, with lamps, and the latter were fed through the conduits also. Other contractors may get some useful ideas from a consideration of this arrangement.

Mr. McLaughlin conducts an electric wiring and supply shop at 65 North Prairie Street, Galesburg, where he has built up an excellent business. He was assisted in demonstrating the exhibit by his wife, who may be seen at his side in the photograph. Mrs. McLaughlin is an enthusiastic electric booster, and convinced many Galesburg dames of the desirability of using percolaters, toasters, vacuum cleaners, and other electric devices in their homes.

Many promising inquiries have developed as a result of this exhibit, it is said.



Commendable Exhibit of a Galesburg Electrical Contractor.

Ohio Building Code.

Conflicts now existing between the Ohio Building Code and the codes of Cincinnati and other municipalities, which have caused considerable confusion among builders, will be removed, as far as possible, under an agreement recently arrived at by the State Building Code Commissioners and the State Citizens' Building Committee. The latter organization consists of architects, contractors and others interested in having the situation cleared up, and its recommendations will be incorporated in amendments to the code which will be submitted to the Legislature for adoption. Electric wiring has given a great deal of trouble, in view of the conflicting provisions of the various codes, and the elimination of uncertainty will be no small relief to the electrical contractors.

Speed-Limit Device and Speed Indicator.

A device that will both indicate frequency or speed and protect the apparatus to which it is attached from excessive use in speed can be made up by using a small standard steam governor. This is mounted on a small plate which is fastened by angle-iron to a large plate on which the whole device rests. The stem from the governor is lengthened out and connected to a needle, which moves across a dial which can be calibrated as desired. Any speed within reasonable limits is obtainable by properly choosing size of the driving pulley. Adjustment is made by means of the adjusting screw on the governor.

The pointer is made up of a piece of iron 0.09 by 0.25 inch pointed at the end and fitted with a copper contact piece on each side. The contacts at the end of the scale are made up of phosphor-bronze and insulated from the scale with fiber. These contacts can be arranged to short-circuit the low-voltage-release coil on rheostat or circuit-breaker.

H. W. Parsons.

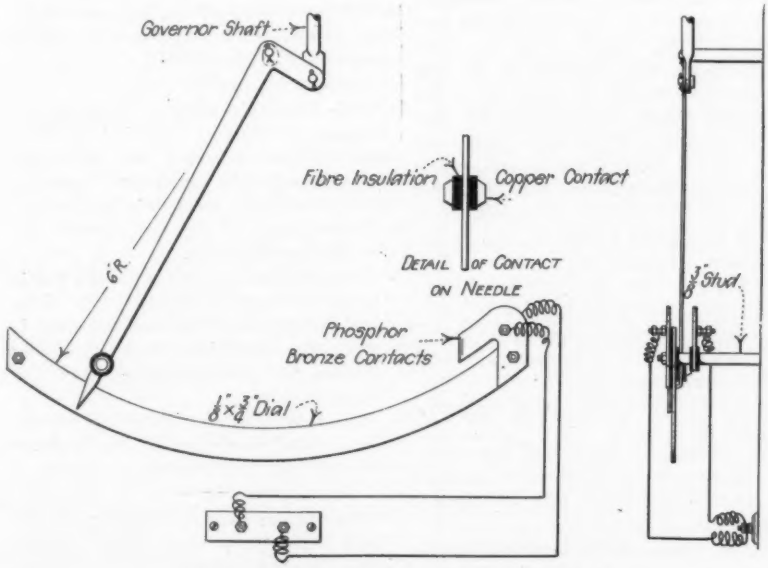


Diagram of Speed-Limit Device and Indicator.

Starting a Large, Loaded, Gyratory Crusher by Reversing the Motor.

At a lime and stone-products plant in West Virginia, trouble has been experienced in starting up a large motor-driven gyratory stone crusher whenever it stopped from failure of power or other cause while its hopper was fully loaded, and although a perfectly good 150-horsepower squirrel-cage induction motor was belted direct to the crusher, it was almost impossible to start the crusher directly with stone wedged down in it.

The stone usually delivered to the crusher is the hardest stone obtained from the quarries. This stone is used for ballast and making macadam roads, etc., while the selected pure limestone goes to the kilns without being crushed. The crusher stone comes from the quarry in all sizes up to what is known as one-man size, which probably weighs as high as 125 pounds. This stone will quite often contain more than five per cent silica.

The stone is pulled up a 26-per-cent grade directly from the quarry in trains of four and six trucks, each truck having a capacity of about 1.7 tons of stone. As it is possible to bring up six trucks simultaneously on each of two inclines, the maximum amount of stone that can be dumped at one time is about 20 tons. Now if 20 tons are dumped at one time, that means a pretty big heap of stone on top of the crusher. If by any chance the power supply should fail just after the dumping began, there would be about 15 tons of stone to be removed. With the ordinary labor available, this means work for five men about two hours, costing the company about $2.50 actual money, to say nothing of stopping the delivery of stone from the quarry, thereby reducing the output.

This crusher is belted direct to a 150-horsepower, 720-revolution-per-minute, 440-volt, 60-cycle, three-phase, squirrel-cage induction motor and requires 22 kilowatts at no load. The average running load is 35 kilowatts. However, with the crusher full of large, hard stones, this motor will not start the crusher in its normal direction of rotation. The scheme was conceived of starting the motor in the reverse direction, and then giving a quick acceleration by throwing it directly onto the line voltage. With a double-pole, double-throw switch this was accomplished and there is enough backlash in the belt and gears so that this scheme turned the trick. Although the reversing switch was only installed about a month ago, it has proven very satisfactory as it has pulled out three choke-ups, thus easily paying for itself and saving much trouble for the company.

It might be interesting to state that this crusher is a Kennedy No. 9 gyratory crusher manufactured by Chalmers & Williams, and the crusher head operates at about 120 revolutions per minute. When set for making five-inch stone the power required is 22 kilowatt-hours per hour of run plus 0.11 kilowatt-hour per ton of stone crushed. This way of calculating power consumption is a very handy one and in this case has been found to be very accurate.

Arthur C. Hewitt.

Selling Fixtures With a Magic Lantern.

Anyone in a smaller city who has sold electric fixtures often realizes the need of some better means of showing their designs and the best you can do with a show room is to hang up about ten or fifteen styles without crowding your display. In our shop we use a projection lamp which throws up a life-size picture of any fixture in the catalog on a screen at the end of our show room and by throwing it up high near the ceiling one can get an idea of just how the fixture will actually look hung up.

This lamp will project any picture, cut, pamphlet or any opaque object placed under the lens, and greatly facilitates the sale of fixtures, as it is exceedingly difficult for anyone to make a selection from a catalog where so many illustrations are shown on one page as to make it confusing. To show only one fixture on a page would make the cost of the catalog prohibitive and the above suggestion is made with the hope that anyone who has been up against this same problem may benefit thereby.

E. M. Raetz.

Water-Pipe Grounds Approved in Minneapolis.

The city council of Minneapolis, Minn., at its meeting on December 11, voted to grant the Minneapolis General Electric Company permission to ground its wires by attaching them to city water mains. The plan was previously approved by City Engineer F. W. Cappelin.

Meeting of Committee on Wiring of Existing Buildings.

The Committee on the Wiring of Existing Buildings, of the National Electric Light Association, held a meeting in the offices of the National Electric Lamp Association, at Nela Park, Cleveland, O., Thursday, December 10. Among those present were R. S. Hale, of Boston, chairman; S. E. Doane, of Cleveland; H. R. Sargent, of Schenectady; W. A. Donkin, of Pittsburgh; G. B. Griffin, of Pittsburgh; Theodore Dwight, of New York; W. J. Canada, of Washington; A. J. Hixon, of Boston; F. M. Grant, of Cleveland; and J. E. Latta, of Chicago.

The Committee considered the advisability of recommending various changes in the National Electrical Code, where it appeared that such changes would increase the safety of electric wiring without increasing its cost, or reduce the cost without resulting in hazardous construction. A final report on plugs and receptacles was adopted. It was voted to recommend that the Code be so changed as to require the omission of the fuse in the neutral of three-wire services in installations having the neutral grounded. Data on wiring costs previously collected were found to be of such a kind as not to afford the information wanted in dependable shape, and a subcommittee was therefore appointed to collect further data. This sub-committee will ask contractors in various parts of the country to submit bids on the wiring of houses of representative types, the types and classes of buildings to be wired and the kind of wiring to be installed being specified by the sub-committee. In this way it is hoped that some valuable information on costs per outlet will be obtained. A sub-committee was appointed to consider the advisability of giving fuses and fuse bases colors distinctive of the sizes of the fuses. For example, it was thought that it might be desirable to give a 10-ampere plug fuse a coat of paint of a color that would be used to mark the fuse base on branch circuits, the aim being to provide the householder an easy means of knowing when circuits were properly fused. It was reported that a committee on the system of wiring using sheathed conductors of the concentric type, which is being considered for use in the United States, had prepared recommendations which would be presented for adoption in the National Electrical Code. The committee favored the adoption by the National Electric Light Association of Cushing's "Standard Handbook on Wiring," and decided to advise the Executive Committee of the Association to buy copies to be resold to members. This book is to be revised so as to include pages prepared especially for the Association. The present Code requirements which call for a separate circuit for each lamp where two lamps would take more than 660 watts came up for consideration. Members of the Committee thought that several lamps might be run on one circuit, whatever their wattage, provided wire of the proper size was used, and provided further that the fuse would properly protect the sockets and fixtures. This matter was referred to another committee. Meeting adjourned to convene again in February, the next meeting to be held either in New York or Boston.

Boston Contractors Dined.

Contractors engaged in doing the wiring of buildings in coöperation with the Boston Edison Company were the guests of General Superintendent Atkins at dinner recently in the Edison restaurant. L. R. Wallis, of the Edison Company presided, and Mr. Atkins related the progress that has been made during the past year, during which time 1,249 houses and 1,256 stores have been equipped for electrical service. This business represents $134,000 to the contractors and supply men, about $2,400 being paid the former as bonuses for securing the business.

Mr. Wallis said a total of 1,635 houses had been wired during the year in Edison territory. Of the 1,249 installations under the Edison financing plan, 904 were procured by company agents and 343 by contractors. Most of the contracts were for a much larger figure than the minimum, $14.35, which covers wiring and a few simple fixtures.

M. S. Seelman, of the Brooklyn Edison Company, was a guest. He outlined a similar house-wiring plan in vogue in Brooklyn.

R. S. Hale, of the Research Bureau, Converse D. Marsh, advertising expert, and L. D. Gibbs, superintendent of advertising in the Boston Edison Company, also spoke.

Among the Contractors.

B. H. Turgean has opened an electric shop at Hinsdale, Ill., where he carries a line of motors, fixtures and supplies, as well as doing a construction business. Among his early contracts was one for wiring the new bank building.

Fischer Brothers, of Cincinnati, O., have been awarded the contract for installing the electric wiring and the charging system, with a capacity of 24 electric machines, in the Doepke Garage, in Avondale.

The Neal Electric Company, of Seymour, Ind., has just been awarded a contract for wiring and installing fixtures in the new Odd Fellows Hall in Seymour. Mr. Neal, who is at the head of the company, formerly was state electrical inspector for Indiana

The F. A. Clegg Company has taken the contract for wiring and electric installations in the new motion-picture theater of the Broadway Amusement Company, Louisville, Ky. The contract calls for 800 lamps and the installation of a motor-generator set and three motors.

Electric wiring for the new New Orleans freight depot of the Louisville & Nashville Railroad Company will be done by the same company.

Fred Etzkorn, electrician at the Columbia Theater, Portsmouth, O., underwent an operation for the removal of a bone in the nose. Nine years ago, while wiring a band stand in Columbus, O., he came in contact with a live wire, which knocked him to the ground, 20 feet below, fracturing his nose. The operation was successful.

The Columbia Electric Engineering Company, Boston, Mass., has been awarded the contract for installing 3,000 lamps on the municipal Christmas tree, which this year will be located in the center of the Frog Pond on the Boston Common.

The illumination was to be ready December 19, and be lighted every night until January 1. The tree this year is over 50 feet high, and especially selected for this purpose from the Maine woods.

The $50,000 Parkman Memorial Band Stand nearby, will also be decorated by this company.

The Vedder Electric Company, Cleveland, O., is very busy at the present time, having procured the electrical contract for the Cleveland Filtration Plant on the Lake Front West Boulevard, consisting of five buildings with an elaborate system of lighting throughout. Central galvanized conduit and B. F. Goodrich Company's 30 per cent No. 12 duplex wire will be used. This company has also just completed two motion-picture theaters, with new stage switchboards, interlocking dimmers and grand master switch; also the East Denison School.

Jobs to be finished this month include bottling plants for the Pilsener Brewing Company and the Diebolt Brewing Company; the Euclid Square Building; the I. O. O. F. Building; and the East High School. The latter is being re-wired in rigid conduit, using Crouse-Hinds special fittings, exposed work.

National Association of Electrical Inspectors.

THOMAS HENRY DAY, President, 59 Deerfield Avenue, Hartford, Conn.
H. S. WYNKOOP, Vice-President, Municipal Building, New York, N. Y.
WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.
JAMES E. COLE, Representative on Electrical Committee of National Fire Protection Association, City Hall Annex, Boston, Mass.

Executive Committee
EUGENE N. DAVIS, Chairman, Brookline, Mass.

SECTION REPRESENTATIVES:
C. H. Fletcher, H. Burnes, British Columbia.
A. W. Hopkins, G. W. Perry, Western New England.
Washington Devereux, A. H. Lilley, Philadelphia.
E. N. Davis, H. A. Knight, Eastern Massachusetts.
C. A. Hannan, O. E. Smith, New York City.
C. W. Mitchell, John W. Carrell, California.

MEMBERS AT LARGE:
George L. Collison, Frank R. Daniel, James H. Fenton, F. G. Hartwell, J. E. Latta, James B. McCarthy, Thomas D. MacColl, A. A. Moffitt, R. P. Strong

"LET THE CODE DECIDE."

Secretary's Message.

The Secretary has as yet received no suggestions for changes in the Code from any section or member, except the Eastern Massachusetts Section. It would appear either that the members fail to appreciate the method which is provided for placing suggested changes before the Committee and which we believe is a very excellent one; or on the other hand that the Code is now in such excellent shape that none of the many inspectors in our membership can think of any changes which he believes would be advisable. In this case the Electrical Committee of the National Fire Protection Associaton is certainly to be congratulated.

There are so many things of interest upon which the Secretary might comment this week that he fears almost to write anything lest he may inadvertently overstep the bounds of his office. However, he trusts that the members and also those not members who read this column will bear in mind that whatever he says outside of official announcements is his own personally and not formal Association statements.

In the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of December 5 appeared a quite extended parallel of the English, German and National Electrical Code rules which certainly must furnish any thoughtful inspector with a great deal of food for reflection, and in the issue of December 12 on page 1134 an article on "Wiring in Violation of the Code" which will give him still more.

Personally I am in hearty accord with anything which will reduce the cost of wiring and increase the load-factor. I am not in accord, however, with any such procedure as is brought out in the two questions which are printed in this issue following this message. It is a positive fact as I know from experience with one of the largest supply companies we have, that the statements of both of these questions are facts although I did not originate either. I have personally seen on sale in its sale room an appliance for heating taking over 500 watts, fitted with an attachment plug, and been told by the attendant that it could be used on any socket and lighting circuit. On my calling his attention (by asking the question "Will the Code allow that"?) to the case, he replied "Oh, that's all nonsense, I tell you you can use it anywhere." And yet we all know that the first thing that will be done in most cases will be to put that attachment plug and device right on to a socket which is rated and approved for not over 250 watts, and moreover, as like as not, the socket wil be one of four on a fixture over a dining table, which is wired with No. 18 fixture wire.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Now turn to the houses in the town mentioned in the article referred to above. There is just one thing that saves that town from trouble and that is lack of moisture. Those little frame houses are amazingly dry inside. Bar a leak in the roof directly on to the wire and you are safe. In the absence of moisture anything outside of a direct metallic connection will give a high insulation, as we hardly expect voltages in houses high enough to produce corona, or direct ionation of oils, paraffin, etc.

But once you let a wire with bad joints happen to be in a place where a pipe which sweats in summer can moisten it or drip down round a foolishly placed ceiling-fixture outlet and see what happens.

It is sheer absolute tommy-rot to suggest that because the fire hazard to other causes is "far in excess of that from the worst wiring" (which is not true anyway) that therefore we might as well reduce requirements until the ratio approximates more closely to unity.

Personally, being an inspector in an outlying suburban town with a considerable farming population, I have seen a few things. I have gone into a kitchen and seen a length of flexible across the ceiling from a center outlet to a lamp supported over a table from a screw eye, and the baby's wet diapers hung over that twisted cord to dry. I have gone down cellar and found where the two wires had slacked up a little and were being used as a place to hang—hoes, rakes, etc. (!), the weight drawing the wires into contact.

In one case in the basement of a little store I found one dozen sickles hung up that way, though I confess that is an exceptional case, but the proprietor had not thought of any harm. I hate, though, to think what might have occurred before spring came due to vibration from the walking about overhead.

I think that there are ways, perhaps, in which the rules might be modified to reduce cost, but I do not believe taking the iron boxes off is a good thing in the case of switches. Personally I require them at all outlets.

I have sometimes thought we might use flexible as is suggested, as is done in England, but I am made to hesitate because our people are much more reckless and will hang things on wires and sometimes use pins and clips, while the absence of frame construction over there is an important factor.

I must, however, return to my first statement. You move that fortunate—doubly fortunate—little town out of the

Central West, and locate it where exposed to a damp sea fog, or along a river bottom with rich meadow soil, clay subsoil and August humidity, and see what will happen to badly taped joints. Hot days, foggy nights toward fall when it gets chill, and the fog is charged with organic acids from decaying matter in cranberry meadows, etc., along the river, will work an amazing amount of havoc sometimes.

I once found where the house service entrance under the eaves of a farm house had served to rendezvous a swarm of bees, and inside the mains ran squarely through a good-sized nest, but the bees had most thoughtfully coated each wire with a good half-inch of wax, a much wiser plan than that of the average rat, not only for the bees but for the household at well, but maybe there wasn't a jamboree when the attempt was made to pull those wires out, after cutting them on the attic side of the wall space in course of changing the service entrance.

Still I used that as an argument to emphasize the reasonableness of my requirement that the wires should enter the house through iron pipe with an outside terminal fitting having a separately bushed hole for each conductor and the farmer who had been kicking about the extra cost saw my point while he was clearing out the mess in the wall. To be sure I cheered him up by buying some of the honey comb which in spite of the conditions proved mighty good.

Referring to Answer 2 (M) to Question 283, I might say that in Massachusetts I think there is a very close and growing spirit of co-operation between the inspectors' organization (the Eastern Massachusetts and Western New England Associations) and the contractors' association. Speaking as the Secretary of this national association I may say, to bear out his statement, that I have never received in any way, shape or manner, any request to join or co-operate with any of the various get-together electrical organizations of the day. Of course what the attitude of the Executive Committee in such a case might be I have no means of knowing, but the fact remains we have never been approached.

The Secretary recently received "for the Association library" two pamphlets from England, the first from the British Fire Prevention Committee with its compliments being "Great Britain and the European Crisis," giving the full diplomatic correspondence and proceedings and speeches in Parliament before the outbreak of hostilities. It is most intensely interesting to read and I wish all the members could see it.

The second is a little pamphlet, issued by A. P. Lundberg & Sons, specialists in accessories of lighting heating and small power apparatus, of 477 Liverpool Road, London, giving diagrams of about 100 wiring arrangements with different switching schemes. It would certainly seem from a perusal of this and an examination of the many devices they carry that switches must be used much more widely in many cases than is customary with us. It is sent postpaid to any address for 14 cents per copy and contains many valuable hints on switch arrangements.

Overloads of Large Lamps.

Question 282. Certain public-service electrical supply companies are offering free renewals of tungsten lamps of 60 watts and over but not smaller sizes, at the same time accepting any sized stub in exchange. This results in overload of circuits made up on the basis of 16 40-watt outlets. How can this condition be dealt with?

Answer 1 (P). This overloading of circuits can never be stopped, that is to say, the apparent overloading. Dependence must be placed on the fuse. If the fuse is of proper size and continues to hold, the overloading is a matter of theory more than practice. We talk of overloading circuits by placing more than 660 watts thereon, forgetting that what we really mean to say is that the circuit is over-supplied with energy-consuming devices which in themselves cannot constitute an overload unless most of them are in service simultaneously. After having seen to it that the original installation is in accordance with the Code, resurveys should be directed mainly against overfusing.

Answer 2 (E). I am unable to give advice unless it be to try moral suasion. Attention can be called to the overload, the consumer being the person to whom the advice should be given.

Answer 3 (H). Frankly I do not know. The trouble, not confined to any one section of the country, is that certain public-service people consider themselves, their own convenience and load-factor superior to any code, statute or ordinance.

Answer 4 (F). One remedy lies in frequent re-inspections of equipments in the territory.

Answer 5 (B). We know of no way other than rigid inspection to deal with the matter of larger-wattage lamps being used in sockets originally installed with the idea of 40-watt lamps or less utilized therein. Even with so-called rigid inspection the possibility of conditions referred to in question are bound to exist.

Answer 6 (U). This is a matter which should be dealt with through the National Electric Light Association, in my opinion.

Answer 7 (N). So far as the Code in concerned I believe the only solution lies in the Laboratories undertaking the solution of the problem of a special fuseholder and fuse for standard lighting tap circuits and then the absolute enjoining of the use of any other fuse thereon.

The evil is unquestionably a large one and growing also. Unfortunately, also, the worst offenders are some of the largest companies.

If it cannot be reached thus, then I believe that it should be taken up by the fire commissioners who are now being appointed in many places in conjunction with public service commissions and the people guarded against the results of their own ignorance and the wanton recklessness of the supply company desiring to increase its load-factor.

Answer 8 (S). This is a serious and perplexing question. If an inspector has the power to enforce the 660-watt rule and would try it on a few of this company's customers, I think that the persons at fault would see their mistake and try to live within the Code.

Answer 9 (V). Try to get at the heads of the company, and get their cooperation and meanwhile remember that it will be very rare that all the 16 lamps will be going at once.

Answer 10 (A). This is a question for the Committee on the Code. While the Code says not over 660 watts in a circuit, it does not say the number of lamps. With the large lamps which are on the market today it is difficult to prevent a person from using them. I shall say the best thing would be to cut down the number of lights per circuit and I see no other way of doing.

Answer 11 (O). It would seem to me that the offer of exchange of this kind is a trick on the part of the operating company to increase its load and I should rather expect that the inspector's problem would solve itself soon after the customers begin to pay their increased bills. If the conditions of overloaded circuits becomes general it will mean a change of the rules to reduce the number of sockets allowed per circuit.

Answer 12 (Q). The burden should be placed where it belongs on service company and on consumer. If a fire occurs the blame should also be placed on the party responsible for the cause. If the rules of safety are wantonly violated there should be somewhere a penalty to fit and follow the crime.

Overloads of Other Devices.

Question 283. In the sales room for electrical devices maintained by a

large light and power company are offered for sale all sorts of devices fitted with attachment plugs of small size, and purchasers are told that they may be used in any socket. In reply to an inquiry about something heard as to wattage limitation, my informant states he was told there was no need to bother about that. How can this condition be met?

Answer 1 (P). This must be considered in connection with Question 282. It is only on the ground of a probability that a blown fuse will be replaced with a larger one that the connection to a circuit of energy-consuming devices totalling more than 660 watts should be prohibited. The really serious phase of the problem is often overlooked. This is the overloading of the individual socket rated at 250 watts, by the attachment of a 500-watt iron or vacuum cleaner. Taking the questions together, the practical way of meeting a difficult situation is to my mind to eliminate the 250-watt socket and then watch the fuses.

Answer 2 (M). Replying to both questions at once, unfortunately the "co-operation" about which we hear so much lately among the various branches of the electrical fraternity has not been extended to include the inspectors. To me it appears impossible to attempt to answer these questions without a knowledge of local influences and men responsible for the conditions existing.

Answer 3 (H). See my answer to Question 282.

Answer 4 (F). This condition is partly taken care of by a wise provision of the Code limiting branch circuits to 660 watts, which is one-half the carrying capacity of the smallest wire permitted.

Answer 5 (B). The conditions referred to in this question we think exist in all places where electrical appliances are sold. In so far as this territory is concerned we know of no way to overcome same other than promptly to condemn any improper appliance whenever same is found installed. This when followed consistently tends in a large manner to reduce the evil complained of.

Answer 6 (U). This is frequently due to the fact that the salesman is ignorant of the conditions under which electrical devices can be used and can only be met by personal interview with the head of the light and power company.

Answer 7 (S). This is a hard question to deal with as every inspector very well knows. He has no control over the tenant or owner of the house after he has approved the lighting installation. If the lighting company and the appliance store were required *to take the name and address of every purchaser and turn same over to inspection department* it would stop a great deal of this over-loading.

Answer 8 (V). I have found it has done much good to circulate a warning against replacing fuses with larger than original sizes.

Answer 9 (A). This seems to be a general complaint. The company is there to sell goods and power, and frequently does not seem to care whether a man burns his house or his neighbor's down or not. It isn't up to them. As it looks now it is up to the consumer to learn his lesson. There is only one other way, which is to boost the size of copper from service switch to outlet and the capacity of the socket.

Answer 10 (Q). Co-operation with service company would be the proper method; if that is refused and a fire occurs put the blame upon the person responsible.

A notice posted at distribution center notifying the consumer of the danger of any changes made in the service might have some effect.

Answer 11 (R). F. Ellison, of Oakland (Cal.) Inspection Bureau made the following suggestion to me: that fuses for 660-watt circuits be made with a certain character or dimension to fit only cutout blocks made to receive them and that manufacturers supply only 10-ampere fuses for such blocks. (Also for 282.)

Answer 12 (N). The local by-law under which I work contains this provision: "No person shall attach to a circuit or use any electrical device until same shall have been approved for such use and location by the Inspector of Wires," etc.

I know perfectly well that this is probably violated every week, but it would be a physical impossibility for one man to cover my whole territory and see that it was not violated. However, by talking and explaining one can do a great deal; moreover the Annual Town Report is distributed to each voter and household, and in my report, printed therein, I always devote a page to just such matters as this and explain simply why the rule is made and illustrate by one or two examples.

Thus two years ago a young lady put an iron on a table-lamp socket on a mahogany table to iron out a lace collar in her room, then was called by a friend to come across the street and get a soda. When she came back the results were such that her comments combined with a ten-minute talk by me to the Women's Club have brought about astonishingly good conditions which still persist to a large extent.

We must, it seems to me, develop a safe large-wattage key socket, and a positive non-substitutable tap-circuit fuse.

Answer 13 (O). Looking at the matter of portable electrical devices from the viewpoints of the manufacturer, the supply dealer and the electric light company, the restriction imposed by the 250-watt rating of the ordinary key socket is simply a nuisance. In the face of a popular demand from practically every interest, with the exception of the fire insurance companies, for the increasing use of portable appliances of all sizes and kinds, and considering the ease with which a purchaser may connect any of these devices to his lamp sockets by means of the usual Edison attachment plug, it would be hopeless to attempt to control the situation by the inspection of individual lighting installations. Pressure must be brought to bear on the manufacturers of sockets to induce them to develop satisfactory key sockets rated at 660 watts. When this is done, the Code rules can be amended to prohibit the 250-watt key socket.

Answer 14 (E). This question, like the preceding one, will not find its answer in the Code and can only receive suggestions and advice from actual field experience. I made a number of inspections in a city, the local lighting company being owned by a company having the ownership of a number of companies. I found that a number of 250-watt lamps had been installed, by the company, without regard to Code requirements. I took it up with the local manager and he requested me not to call the attention of the consumers to what I had found, as he was desirous of increasing his load and thus making a good showing. I gave him 30 days in which to correct the defects, he promising to do it and to refrain from similar installations. The 30 days elapsed and I again visited the places and found that nothing had been done and that more, similar, installations had been made. Upon my second visit I saw that the 30 days, to him, were not sincere and he plainly told me that he was not overanxious to have the Code prevail in his city. To have argued with a man of that character would have been a waste of time. I went to the private office of the man highest up; the man who was the directing head of all of the subsidiary companies owned by the parent company. I did not spread my facts before him at once. I told him I had called to secure his co-operation toward bringing about a good electrical condition in the communities served by his com-

panies. It did not require much diplomacy to secure an agreement and a willingness, on his part, to have his local superintendents and managers understand that he and I were in accord toward having the best possible condition, in so far as they could so do. I then told him of my experience with one of his managers. A man from his office was deputized to go with me to this city where the unsympathetic manager was in control, and there, learn, from me, the nature and location of the defects, correct them and report back to headquarters. What was said to the other man, I do not know. I cannot feel that the expressions, in the above question, represent the desires and feelings of the heads of the company. If it were in my territory, and I knew of it, I would go to the man highest up, go in a reasonable manner, explain to him the possible result of such procedure on the part of his employees. I have yet to find when such a way has been without the desired result. In a word, it is up to the local inspector.

Chicago Bureau of Electrical Inspection Has Annual Celebration.

The Gold Room of the Congress Hotel, Chicago, was the scene on the evening of December 10 of a banquet and entertainment given by the Bureau of Electrical Inspection of the city of Chicago. It marked the thirty-first anniversary of the establishment of the Bureau as one of the branches of the municipal government. The thirtieth anniversary celebration held last year was so successful that it was decided to hold one each year. The occasion of last week excelled the one of last year in every particular. Over 100 were present, including practically all the city electrical inspectors, other employees of the Bureau, their ladies and several special guests.

After an excellent dinner, addresses were made by Victor H. Tousley, chief electrical inspector, Edward B. Ellicott and William Carroll, former city electricians and heads of the Department of Electricity, and Ray Palmer, commissioner of gas and electricity and present head of the Department, of which the Electrical Inspection Bureau is a branch. The Bureau was organized in December, 1883, with one inspector; now it has 69 employees and is the largest city electrical inspection organization in the country, if not in the world. Over 115,000 separate inspections were made last year. An increasingly important feature of the work is the reinspection of old installations, which, although now confined to buildings in which special hazards to life and property exist, will be extended from time to time to cover all electrical installations. The fees of the Bureau make it more than self-sustaining. Its record throughout its organization has been unblemished.

Following the addresses, large bouquets of flowers were presented to the wives of the former and present heads of the Electrical Department and Electrical Inspection Bureau. Musical, prestidigitory, caricature and scenic entertainment features concluded the evening's festivities.

Missouri Telephone Association Meeting.

Four hundred members of the Missouri Telephone Association gathered at Kansas City, Mo., on December 9 and 10 for the annual convention held at the Coates House. It was from many standpoints the most successful ever held by the Association. Nearly every person present reported rapidly expanding business and this included some 50 representatives of equipment supply companies. The program included a talk on the requirements of the war tax by F. B. Mac Kinnon, secretary of the National Independent Telephone Association, Washington, D. C.; a talk illustrated by stereopticon views on storm and flood damage, by W. O. Pennell, building and equipment engineer of the Southwestern Telephone & Telegraph system, St. Louis, Mo.; explicit suggestions in the direction of uniform rules by Frank Lathrop, telephone and telegraph expert of the Missouri Public Service Commission; suggestions on accounting by J. M. McShane, chief accountant of the Public Service Commission, and an address on telephony by J. C. Kelsey, editor of *Telephony*, Chicago.

The officers of the Association were reelected as follows: Houck McHenry, president, Jefferson City, Mo.; A. B. Clarke, treasurer, Kansas City; W. W. Johnson, secretary, Jefferson City; Executive Committee: H. C. Todd, Maryville; J. A. Hudson, Columbia; C. W. Boutin, Cape Girardeau; C. J. Meyers, Kansas City; S. T. Neill, Clinton; M. L. Golladay, Holden; R. A. Guthrie, Macon; G. V. Ross, St. Louis; W. H. Bassett, St. Louis.

A feature of the convention was the exhibit of supply houses, 15 having separate rooms on the convention floor of the hotel for the display of equipment.

The Automatic Electric Company, Chicago, whose display was in charge of W. F. Benoist and L. A. DeBerard, arranged to take interested visitors to the new union station to see the private automatic installation there.

L. G. Le Bourveau, secretary of the American Electric Company, Chicago, showed a new transmitter having fewer parts than former ones and a false front that can be removed for plating without taking the transmitter out of service. Other new things shown were a receiver with welded magnets and removable coils; and a ringer with self-contained and self-locking adjustments.

The Swedish-American Telephone Manufacturing Company, Chicago, displayed the company's telephone equipment and switchboard apparatus.

Reliable Electric Company, Chicago, aroused considerable interest with a new cable terminal.

The Cracraft, Leich Electric Company, Genoa, Ill., had a large exhibit, and took occasion to announce the opening of a Kansas City branch, which is located in the Marietta Chair Company Building.

The Monarch Telephone Manufacturing Company, Fort Dodge, Iowa, aroused interest with its showing of equipment for direct-current selective systems for magneto exchanges.

The Western Electric Company, with a generous complement of equipment, was represented by Fredrick B. Uhrig, manager, W. B. DeForest, head of the telephone department, and others.

The Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., had an interesting exhibit of equipment.

Relief Measures Taken by Berlin Electrical Engineers.

The Electrical Engineers Society of Berlin, Germany, has made the following appropriations: for the Berlin Red Cross Society, 1,000 marks; for the fund to assist Germans in foreign countries, 1,000 marks; for the fund to assist families of those fallen in battle, 1,000 marks; for families dependent upon enlisted men, 500 marks; for the Society for Children's Kitchens, 100 marks; for the National Service to Women, 200 marks.

The society is further subscribing 500 marks (about $120) monthly to a fund to be loaned without interest to electrical engineers in temporary need.

An employment bureau has been organized by the society in conjunction with the Verband Deutscher Electrotechniker and the Verein Deutscher Ingenieure to enable engineers out of employment to find positions vacated by those who have entered the military and naval service.

St. Paul Christmas Tree.

The Jovian Chapter of St. Paul will again trim two large municipal Christmas trees for the children of St. Paul and their friends.

Last year they were used in the Public Auditorium and then afterwards moved into the park. This year they are to be erected in the park, outdoors.

The Committee on Christmas Tree Trimming consists of R. H. Eddy, chairman; R. D. Harrison, A. Hubbard, Frank Drake and E. T. Street.

In its plant at Toledo the Willys-Overland Company is replacing its oil annealing and tempering ovens with electric furnaces.

Among the Supply Men

Birmingham Convention of the National Electrical Supply Jobbers' Association Great Success.

The National Electrical Supply Jobbers' Association held its quarterly meeting at Birmingham, Ala., on December 8, 9 and 10. Headquarters were established at the Tutwiler Hotel. With everything against it on account of the demands made upon so many jobbers and manufacturers at this season of the year, and the long journey entailed upon the part of most of those in attendance, there was an assemblage of record-breaking proportions which turned out in deference to the invitation of Oscar C. Turner, president of the Turner Electrical Supply Company, of Birmingham, who acted as host. The formal program began with an open meeting at 11:00 o'clock Tuesday morning, December 8.

Franklin Overbagh, general secretary of the Association, introduced Judge A. O. Lane, of the Birmingham City Commission, who welcomed the delegates on behalf of the city. Paschal G. Shook, president of the Chamber of Commerce, on behalf of the civic organizations of the city, extended a hearty greeting. The response was made by Thomas M. Debevoise, counsel for the Jobbers' Association, who made eloquent reply.

Closed sessions were held on Tuesday afternoon and on Wednesday and Thursday mornings. The magnificent golf courses of the Birmingham Country Club and the Reobuck Golf Club were thrown open to those attending the meeting, and over 100 jobbers and manufacturers participated in the various events.

On Tuesday evening a cabaret and smoker were tendered to the men by the Birmingham Newspaper Club. The meeting was gracefully presided over by Mr. Turner, and in addition to speeches which were made by Paschal G. Shook, president of the Chamber of Commerce; Homer E. Niesz, of Chicago, Jupiter of the Jovian Order; A. A. Gray, managing editor of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN; J. H. P. DeWindt, vice-president and general manager of the Birmingham Railway, Light & Power Company; Judge Thomas M. Debevoise, counsel of the association; Culpepper Exum, ex-mayor of Birmingham, there were a number of extraordinary and interesting events. Brief remarks were also contributed by Samuel A. Chase, Franklin Overbagh, W. R. Herstein, H. C. Rice, Frank E. Watts, William J. Dougherty and Thomas G. Grier.

During the course of the evening Mr. Turner made a very eloquent speech commenting on the services of Mr. Overbagh as general secretary of the association. He said it was a privilege and an honor to present to Mr. Overbagh a magnificent cut glass loving cup and punch bowl on behalf of the members of the association. As the waiter came down the aisle bearing the crystal service aloft, Tom Heflin arose from his chair and lurching into the waiter threw him to the floor. The punch bowl and loving cup were smashed and the crowd was visibly shocked until an instant later a chorus of loud-mouthed newsboys started screaming "extra" and distributed a complete edition of one of the local newspapers which had as its feature article a vivid description of the breaking of the "priceless" gift through the misconduct of Mr. Heflin. Then everybody was relieved to find it was only a joke. Immediately after this Judge Debevoise was eulogized for his services to the association, and on behalf of the southern jobbers was tendered a bale of cotton. As he stepped forward to take possession of the bale the pretty soloist of the Birmingham Newspaper Club stepped from the bale and implored him by song and gesture to buy a bale of cotton, indicating that although it was a "fake" it was indeed similar to the speeches that he was "prone to make" and suggesting that there was just as much value in the make-believe gift as there was in much of the defense that the worthy judge had put up for the worthy jobbers whom he served so well.

During the speech of Mr. DeWindt he took occasion of the opportunity to impress upon his hearers the fact that the Birmingham Railway, Light & Power Company was not an institution that stood in any measure for the aspersions sometimes cast upon it. He explained that the enemies of the organization stated that the initials of the company's name, "B. R. L. & P." stood for "Birmingham Robber, Loot & Plunder Company," but that this was not at all the case. He then said that so far as service was concerned it was second to none in the country. At this auspicious moment the lights began going out all over the hall, there was the weirdest sort of a fluctuation, and a husky individual clad in overalls came upon the scene and informed Mr. DeWindt that he was the assistant engineer at the power house and that the spokes had fallen out of the turbine and as the engineer had gone off with a "fly" wheel he did not know how to adjust the "communicator," and he could not get the station to work. After a very interesting colloquy, it becoming impossible to get service, Mr. DeWindt was forced to strip his assistant of his overalls and don them himself and make a rush for the power plant.

Charley White, of Boston, gave a very amusing concert on the piano and many others assisted in the fun, which was kept up until after midnight and ended only when Mr. Shook solemnly pronounced the benediction.

The visiting ladies were royally entertained by the citizens of Birmingham and their every comfort looked after by a most efficient ladies' committee of which Mrs. Oscar C. Turner was chairman. There were automobile rides to various parts of the city, and on Wednesday evening a dance was given at the magnificent Birmingham Country Club. Just before the last dance the presentation of the cups won at the golf tournament was made to G. W. Johnson, W. J. Dougherty, W. W. Low and C. J. Litscher of the jobbers; and J. H. P. DeWindt, R. T. Brooke, W. J. Grady and A. H. Berry of the manufacturers.

The entertainment features of the convention were concluded on Thursday afternoon when a trip was made by special train to the industrial district of Birmingham, when the mines and furnaces of the Tennessee Coal & Iron Company, the wire mill and by-product plant of the American Steel & Wire Company, and other industrial organizations of a similar character were inspected by the visitors.

The convention broke up on Thursday evening and a party of about 50, under the leadership of Col. Robert C. Churchill, president of the Electric Appliance Company, of New Orleans, made a brief journey to that southern city.

Seven trackless omnibuses have been purchased in England for use as adjuncts to the electric street-car service in the International Settlement at Shanghai, China.

Public Service Commissions

Conducted by William J. Norton

ILLINOIS.

Competition Unnecessary. In the decision authorizing the consolidation of the Lake Shore and other railroads in the New York Central Railroad Company, the Commission says that it does not disapprove of merging or consolidation of public utilities in Illinois, where the same can be effected without violating some positive law. The decision points out that, formerly, without reasonable regulation and control of public utilities, competition seemed to be the only method of protecting public interests, but with such comprehensive regulatory laws as are now in force in Illinois competition losses its force as a corrective agency. The opinion concludes, "It follows, therefore, that the general plan of consolidation proposed is in complete harmony with the modern idea of governmental regulation and control of public service corporations."

OHIO.

The Anglaize Power Company was authorized to pledge for a loan its six-per-cent five-year collateral-trust notes of the total principal sum of $188,000 for not less than 80 per cent of the face value. These notes were previously authorized to be sold for not less than 90 per cent of the face value, but the company was unable to dispose of them under the terms authorized due to the financial stringency prevailing generally throughout the country. The Commission finds that the company is urgently in need of the funds.

WISCONSIN.

The Glidden Light, Power and Water Company was authorized to issue $300,000 of stock and $4,125 of bonds. This issue is to be used in erecting and equipping a central station and making the necessary installations therein. The former station of this company was destroyed by fire.

The Eagle Telephone Company, operating a number of small telephone exchanges, discontinued a provision which specified that "subscribers who paid their bills six months in advance would be entitled to 50 free calls per year to parties outside the limits of the exchange from which they were receiving service, and those paying one year in advance should be entitled to 75 such calls." Where subscribers did not pay in advance, a toll charge of 10 cents for five minutes was made for messages between exchanges. Complaint was made to the Commission because of the discontinuance of the free service. The Commission finds that public convenience and necessity would be better served by the restitution of the former practice and points out that the free toll connection has undoubtedly resulted in an adjustment of business and social relations upon a different basis than would have prevailed if toll rates had been levied. Some congestion on the lines and confusion in operation resulted from allowing the free service, and the practice constituted virtually a heavy discount for prompt payment. The Commission finds, however, that the discontinuance of the practice resulted in a decline in revenue, and that such practice could not be said to be unreasonable or unjustly discriminatory. The company was ordered to resume the practice of furnishing free calls.

The company asked for a ruling on a charge for reconnecting telephones where service had been discontinued at the subscriber's direction. Following the action of the company in changing its rates and regulations, a number of subscribers ordered their telephones taken out, and the company asks for authority to charge for reconnection. The Commission holds that a charge for reconnection is reasonable, but that it should not be applied unless it was in effect at the time service was ordered discontinued.

Franchise Value.

The New Jersey Court of Errors and Appeals, in an opinion filed December 9, 1914, in the case of the Public Service Gas Company vs. Board of Public Utility Commissioners, *et al.*, has ruled that an allowance should be included for franchise value in valuations for rate-making.

The Gas Company appealed from the decision of the Board fixing the rate for gas in the territory called the Passaic Division at 90 cents per thousand feet. The Supreme Court affirmed the order and an appeal was taken to the highest state court, the Court of Errors and Appeals. Because no allowance was made for value of the company's franchise, the order of the Board fixing the 90-cent rate is set aside.

Affirming the decision of the Board and lower court as to rate of return, the court says: "We have given it due consideration, and it is sufficient to say that upon an examination of the case we conclude that there was sufficient to support the finding below that eight per cent upon the true value of the properties is a fair and lawful rate of income to be taken into consideration with the expenses and other outgo in determining what price should be charged to the consumers for gas."

The court also concluded that there was no error in the action of the Supreme Court in affirming the finding of the Commissioners upon the valuation of the physical property.

Intangible Property.

For intangibles, the Board allowed 30 per cent of the valuation assigned by them to the structural plant. This allowance expressly included preliminary outlay, such as engineering and legal expenses, canvassing, costs of incorporation, cost of securing franchises, financing, bankers' commission, deficit in operation during the earlier years, and inadequate early returns upon the investment; also "the entire value of all franchises, primary or secondary, possessed or exercised by the company in the Passaic Division."

The Court then takes up the question of franchise value as follows:

"In discussing the matter of franchises, the Commission remarked that its finding as to the total amount of intangible property was 'tantamount to including the franchises of the company at a moderate rating, at a value comparable to the cost of obtaining these or similar franchises. It amounts, therefore,' say the Commissioners, 'to a practical denial of the company's contention as to the value of its franchises.' The Board stated that it is the public policy of the state not to allow the capitalization of franchises for an amount in excess of the actual cost involved in obtaining said franchises; evidently referring to paragraph F of section 18 of the Utilities Act, P. L. 1911, p. 381. We find difficulty in ascertaining from the report the method adopted by the Commissioners for valuation of the franchises. In one place they announce that such

value is included in the 30-per-cent estimate of all the intangible property; in other places they say that there is no evidence before them to show that these franchises should be valued at any more than the cost of obtaining them; in their general summary of valuations the franchises are listed as an item and no value assigned thereto, and the next item consists of patent rights, which the Commission expressly declares to have no value whatever; and yet the Commission conceded that special franchises are property; that when tangible property is operated under franchise rights, the instrument of public service is worth more than the material and labor involved in its construction; that taxation is imposed in respect of special charters as 'property' in this and other states; and that neither franchise nor any other property can be taken for public use without just compensation. These are extracts from the report in its exact language. In dealing with this question the Supreme Court seems to have gone a step further for it held that 'logically no allowance should be made for the value of the special franchise in a case where it is not legally exclusive and where the state still retains the right to fix rates.' 84 N. J. L., 482.

"We find ourselves unable to concur in this result. Without adopting in its entirety the rule laid down in our railroad tax cases, that the total valuation of the property and franchises should be gauged by the market value of the outstanding corporate securities plus floating debt, and that therefore the value of the franchise would be indicated by difference between this total and the sum of the value of the physical plant plus development cost; and conceding that in most of the cases of public utilities the privilege of utilizing the public domain is not exclusive; and is therefore subject to invasion by other similar utilities, and conceding also that charters and local franchises are often granted by the state or the municipality without a cash or property consideration, the conviction still remains that such franchises have substantial value. . . . It seems a fallacy to say that if and because a municipality confers upon a gas company or a street railway company the privilege of using the public streets without any consideration in cash or property passing from the company, the rights thereby conferred should have no value for rate-making purposes; for this disregards at least the meritorious consideration that the promoters of the company have invested their money and given their time and taken their business risks in view of the making of this very concession, and the value of the enterprise on which the owners are entitled to draw an income should not be limited to the mere cash that they have put into it, but should include something for the risk and responsibility that they have taken in organizing and developing it.

"It is true, as the Board remarked, that the Utilities Act forbids the capitalization of franchises. This prohibition, however, refers to the inclusion of a franchise valuation in the par value of capital stock, but does not affect its market value. Just as the value of a bank stock may be and often is legitimately enhanced by public confidence in the directors of a bank and the methods of its business management (Newark vs. Tunis, 81 L., 45; 82 L., 461), so the market value of the securities of a public utility may be enhanced in part at least by the fact that it is operating under a municipal franchise costing little or nothing in cash outlay, subject, it may be, to duplication, but which the public has the right to suppose in a proper case will follow the general run of such franchises and be free from indiscriminate competition although not legally exclusive. Such a situation would be a legitimate element of market value and would be taxable, as reasonably and fairly enhancing the value of the property in the public mind. It would thus be capitalized, not by the utility itself but by the public as a business matter, and against such capitalization there is no prohibition, legislative or otherwise."

The Court reviews the policy of taxing franchises and cites numerous court cases affirming the inclusion of franchise value in value for purposes of taxation.

"It should be unnecessary to remark that our reports would not contain this long line of decisions in earnestly litigated franchise tax cases, were it not a fact that franchises, general or local, state or municipal, have a substantial value of which the taxing authorities are prompt to take advantage, and which value, in tax assessment controversies, the authorities estimate often in large figures. If other evidence of substantial value were needed, it may be found in the fact that as to municipal franchises, the municipality may impose within reason, and the utility must comply with, conditions involving considerable expense. (J. C. & H. R. R. Co. vs. J. C. & B. R. R. Co., 21 Eq. 550.)"

Taxation Value and Value for Rate-Making.

"The respondents, then, must take and sustain this position: That although by numerous decisions, of the Supreme Court, Court of Chancery, and of this court, it has been repeatedly declared that the privilege given to public utility corporations, either directly by the state, or partially by the state and partly by the municipality as a state agency, and whether exclusive or not, is a franchise, and as a franchise is property, to which the utility in a proper case may assert its special right as against an usurper, and as property is subject to taxation, at the will of the legislature, upon a substantial valuation fixed by the taxing authorities; and although its bestowal may be and in most cases is conditioned upon a substantial, valuable consideration in money or contract obligation, yet when in the exercise of its rate-regulating power the legislature deputes an agency to determine a valuation as a basis for the rate, such agency may disregard the unquestionable value that is attached to the franchise for the purpose of yielding an income to the state or its subdivisions, and declare that such franchise has only nominal value for the purpose of yielding income to the utility. We cannot agree to such a proposition. We are aware that some courts have held that a valuation for taxation is not necessarily identical with valuation for rate regulation. This may be so in a measure. Indeed it is readily conceivable that if the franchise were exempt, as it was claimed to be under the act of 1903 (North Jersey Railway Company vs. Jersey City, *supra*) the rate valuation might exceed the tax valuation by the value of the franchise. But normally, when all the corporate property is subject to taxation and also valued for rate regulation, it would seem reasonable to say that the owner of the property is entitled to a fair income on property for which it is taxed. The fact that the state, or the municipality or both, have seen fit to confer a franchise in many cases as a gift (so-called), or for a consideration deemed inadequate in view of the advantages conferred, does not, as it seems to us, create any implication in the grant that the value of the franchise should be disregarded in fixing a reasonable rate.

"Counsel for the company argue that the case of Willcox vs. Consolidated Gas Company (212 U. S., 19), is controlling on this point. *Per contra* it is argued that that decision does not touch the question at issue in that it expressly limits the ruling to cases arising on similar facts. But a reading of the entire opinion will demonstrate, we think, that it is fundamentally grounded on the propositions that franchises are an essential element of the property valuation, that they have a substantial value, and that they should be regarded in fixing a

rate. Indeed, the court went so far as to put its *imprimatur* on a franchise value corresponding to an increase in the par value of the stock at the time of the consolidation; and this was the feature especially limited to the case under consideration. In Smyth vs. Ames (169 U. S., 466, 544-547) the same court discountenanced excessive valuation or fictitious capitalization as a basis of rates, but said that (among other things) the amount and market value of the bonds and stock were matters for consideration and were to be given such weight as might be just and right in each case. This corresponds rather closely with the method adopted by the State Board of Assessors in the case of Central Railroad Company vs. State Board (20 Vroom, 1, 7).

Municipal vs. Private Ownership.

"Recurring to the argument that these special or municipal franchises are given to the utility, or contributed by the public, and therefore should not be estimated in fixing a rate, we repeat that the minor premise is an unwarranted assumption of fact. A municipality desires street car or gas service. It can, if so authorized by the legislature, build and operate its own plant and equipment. Perhaps the cost of installation is too great, so that there would be no sale for the bonds, or the citizens are unwilling to shoulder the interest charge; perhaps, also, the usual extravagance in operation due to public ownership is a deterrent. It is common knowledge that in this country a public utility is usually operated by the public at a loss or an inadequate return. The economic advantage of private ownership is generally recognized. In this situation, a company is organized and asks for a franchise. The risk is all that of the organizers; nothing is risked by the municipality. If it fails, they lose their money. It must operate, however, so long as it does operate, at a reasonable rate, based on a theoretically economical plant and operating expense. It cannot charge the public more than the service is worth, just because otherwise it will not meet its operating expenses and fixed charges. It must pay its taxes, whether it earns them or not. In short, all such franchises are based on a consideration, viz., the risk and obligation undertaken by their grantees; and it will not do to say that the franchise is a public contribution exclusively.

Purchase by Municipality.

"If the plant and franchise be taken over by the public, the franchise must be paid for like any other property. (Monongahela Navigation Company vs. United States, 148 U. S., 312; Brunswick & Topsham Water District vs. Maine Water Company, 99 Me., 371, 59 Atl., 537.) In the latter case the legislature expressly recognized that it should be paid for, but the court did not rest on that; on the contrary it said that even in cases where by statute, franchises were not to be included in the valuation, the court conceived that it must have been implied that the property was to be valued as rightfully where it was, and rightfully to be used; adding that the right to use, and charge reasonable tolls, were the franchises, at any rate the most important ones. Our own legislature has in like manner enacted that certain cities may acquire existing waterworks from their owners by purchase or condemnation; and in such case the property acquired includes the franchises the value of which is to be a part of the award. (P. L. 1906, p. 664; C. S. 850, 852, especially section 7, p. 960.) Other such acts no doubt are on the statute book. And such franchises are in no sense exclusive; for by the very act cited, cities affected thereby may ignore an existing plant and build their own waterworks, subject only, by other legislation, to the approval of the State Water Supply Commission. This was exactly what was attempted in Collingswood vs. State Commission (84 L., 104, 85 L., 673) and denied on the ground not that the existing franchise was exclusive, for it was not, but because the Commission in the exercise of power conferred on it, decided that such new plant was not needed.

"If, as we think is the law, substantial allowance should be made for the franchise of a gas plant if taken for public use, and the value of such franchise paid in money to the owners thereof, we fail to see why, so long as the plant and franchise possessing that value for sale or condemnation are held and operated by the owners, the latter should not be entitled to a reasonable income on all elements of their property including the franchise, in the absence of any charter reservation or contract to the contrary. As was said by the Supreme Court of Maine in the Brunswick case, *ubi supra*, we apprehend that some difficulty in discussion has arisen from attempting to differentiate in logic what is inseparable in fact. The property taken is a single thing, to which belong certain characteristics which affect its value.'

"We do not wish to be understood as laying down the doctrine that the value of the franchise is to be measured necessarily by the total market value of the outstanding capital stock and indebtedness, less physical valuation and development cost, because this would take no account of inflation of stock value; but if such market value added to indebtedness show an excess, such excess is at least evidential that where there are special franchises, such franchises have some substantial value in excess of the mere outlays for legal, advertising and other legitimate expenses in obtaining them. This element was, apparently, expressly excluded both by the Commission and by the Supreme Court. This exclusion, in our opinion, was error. We think there was evidence before the Commission to indicate that from this standpoint the franchises had a substantial value which the Commission refused to give to them, and as the 90-cent rate fixed by the Commission was based on the theory of providing a net income of eight per cent on the total value of the property of the company, the finding of fact that such rate was just and reasonable was in direct violation of the fundamental theory on which the Commission undertook to fix the rate, and is presumably not justified by it. On the appeal of the Gas Company, therefore, the judgment of the Supreme Court will be reversed and the order fixing the 90-cent rate will be set aside."

Union Gas and Electric Company Rates.

The Union Gas and Electric Company, Cincinnati, O., has submitted to the City Council a reply to the King report on electric rates, which was summarized in the issue of November 28, page 1043.

The reply states that the method of rate-making applied by Mr. King ignores both the capitalization and the actual investment in the property, and undertakes to determine its present value by reproduction cost. Without admitting that this rate theory is logical in reasoning or fair in results, the company states this method, when fairly applied, shows that the present electric rates of the Company are grossly inadequate to yield a reasonable rate of return upon the fair value of the electrical property.

The Company finds the reproduction cost new to be $9,402,894 as against $7,952,894 by Mr. King, a difference of $1,450,000; a going value of $1,500,000, not included by Mr. King; and a total minimum valuation, as represented by reproduction less depreciation, of $9,837,565 as against $6,848,760 by Mr. King.

From the earnings of $1,181,866 found by Mr. King there should be deducted $336,624 for future depreciation, $500,000 to meet additional necessary expenses, and $35,000 reduction of income due to a change in wholesale power rates effective September 15, 1914; leaving actual net earnings of $311,242.

A return of eight per cent on the correct valuation would amount to $787,005, so there is actually a deficit in income of $475,763. The electric rates could be increased by about 23 per cent without producing earnings in excess of a reasonable return.

Electrical Engineering Problems.

By R. G. Hudson and W. V. Lyon.

DIRECT CURRENTS.

Problem 15.

Given the magnetization curve (Fig. 14) of a compound generator at 1,200 revolutions per minute. The generator is rated at 230 volts and 30 kilowatts. The shunt field has 1,000 turns, the series field, 30 turns; resistance of armature, 0.08 ohm; resistance of shunt field, 50 ohms; resistance of the series field, 0.05 ohm; demagnetizing mmf. of armature at full load, 600 ampere-turns. The shunt field is connected between the line wires. Find (*a*) resistance of series-field shunt to give 230 volts at terminals at full load; (*b*) terminal voltage of machine at no load under the conditions obtained in Question *a*, and (*c*) terminal voltage of machine at line current of 80 amperes with series-field shunted as in Question *a*.

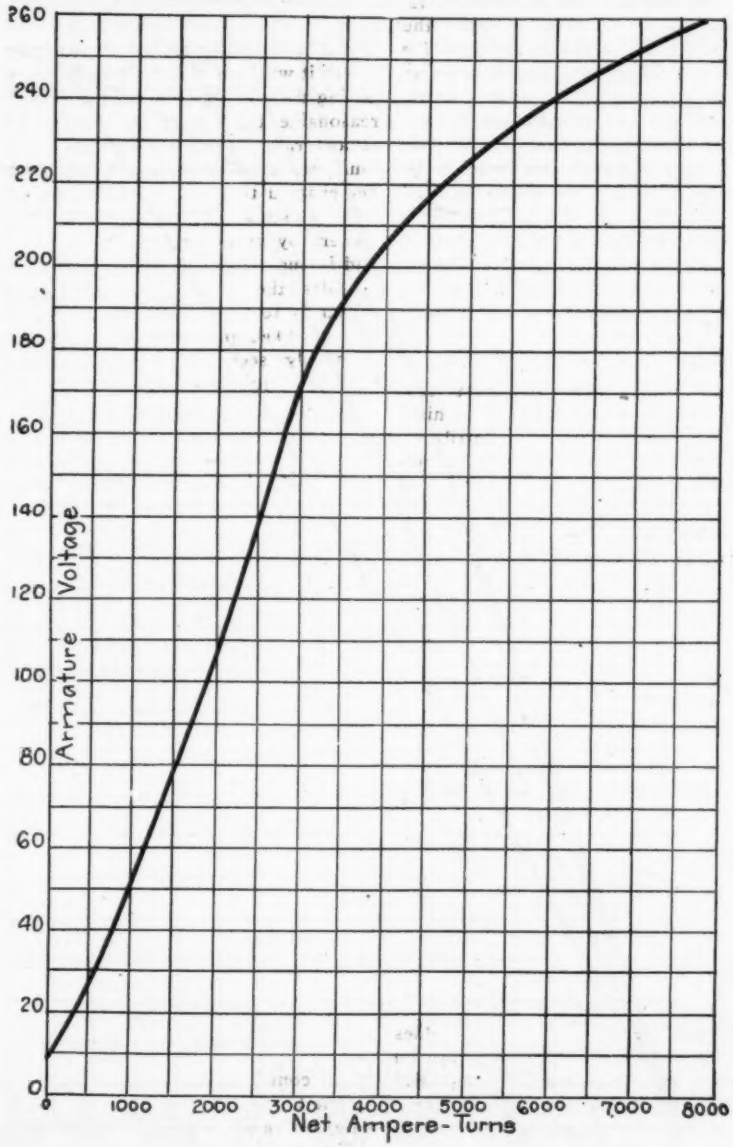


Fig. 14.

ALTERNATING CURRENTS.

Problem 65.

The open-circuit and short-circuit data for a 500-kilovolt-ampere, 60-cycle, 11,000:2,200-volt transformer are: Open-circuit, watts = 2,950, volt-amperes = 7720; short-circuit, volts = 347, amperes = 45.5, watts = 3380.

The low-tension winding is short-circuited and measurements are made on the high-tension side. (*a*) Calculate the regulation of this transformer when it delivers 500 kilowatts at unit power-factor and the rated voltage. (*b*) Calculate the regulation of this transformer when it delivers 400 kilowatts at 0.80 power-factor and the rated voltage. (*c*) Calculate the efficiency for a load of 125 kilowatts at unit power-factor. (*d*) Calculate the efficiency for a load of 500 kilowatts at unit power-factor. (*e*) Calculate the efficiency for a load of 400 kilowatts at 0.80 power-factor. (*f*) Calculate the all-day efficiency for the following condition: a load of 500 kilowatts at 0.95 power-factor for four hours, a load of 350 kilowatts at 0.88 power-factor for six hours and no load during the remaining fourteen hours of the day. The transformer is connected to the supply mains twenty-four hours each day.

SOLUTION OF PROBLEM 15.

Answer to Question a.

The shunt field current (I_f) is given by [6]

$$I_f = 230/50 = 4.6 \text{ amperes.}$$

The mmf. of the shunt field then equals $4.6 \times 1{,}000 = 4{,}600$ ampere-turns.

The armature current equals the full-load current (130.3 amperes) plus the field current (4.6 amperes) or 134.9 amperes. Assuming that the series field current (I_s) equals 70 amperes for a trial computation, the armature voltage (E_a) is given by [3]

$$E_a = 230 + 134.9 \times 0.08 + 70 \times 0.05 = 244.3 \text{ volts.}$$

The net mmf. required to produce an armature voltage of 244.3 volts is found

from Fig. 14 to be 6,300 ampere-turns. The gross mmf. must then be 6,300+600, or 6,900 ampere-turns. Since the shunt field mmf. equals 4,600 ampere-turns, the series field must provide 6,900—4,600, or 2,300 ampere-turns, and the series field current must be 2,300/30, or 76.7 amperes.

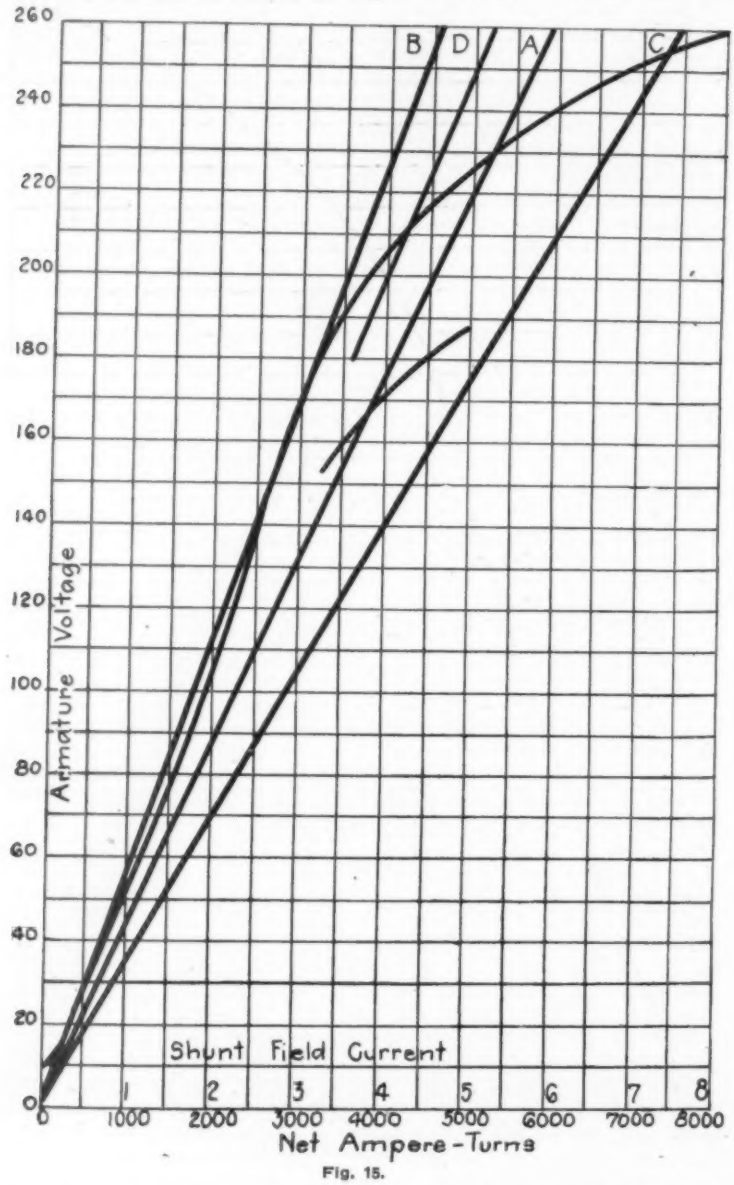


Fig. 15.

The actual armature voltage is then found to be [3]

E_a=230+134.9×0.08+76.7×0.05
=244.6 volts.

The net mmf. (Fig. 14) must then be 6,350 ampere-turns. Adding 600 ampere-turns and subtracting 4,600 ampere-turns as before it is found that the series field must provide 2,350 ampere-turns and that the series field current must be 2,350/30, or 78.3 amperes. Computing the armature voltage again by [3] it is found to be

E_a=230+134.9×0.08+78.3×0.05
=244.7 amperes.

Since this armature voltage is produced by 6,950 ampere-turns, the above value of series field current (78.3 amperes) satisfies the imposed conditions.

The series field resistance voltage ($V_{s.f.}$) is given by [4]

$V_{s.f.}$=78.3×0.05=3.9 volts.

The resistance voltage of the series field shunt then equals 3.9 volts. The series field shunt current equals 134.9—78.3, or 56.6 amperes. The resistance of the series field shunt ($R_{s.s.}$) is then given by [6]

$R_{s.s.}$=3.9/56.6=0.069 ohm.

Answer to Question b.

At no load the resistance (R) of the armature, series field and shunt field is given by [2]

R=50+0.08+0.05×0.069/0.119=50.1 ohm.

Neglecting the mmf. of the series field at no load the armature voltage at no load may be determined from Fig. 15 by drawing a line through O, such as OD, having a slope equal to 50.1. This line intersects the magnetization curve at the armature voltage value of 211 volts. The terminal voltage is then given by [3]

V_t=211—0.1×4.25=210.6 volts, the armature current which equals the field current at no load being read directly from Fig. 15.

Answer to Question c.

The equivalent resistance (R) of the series field and its shunt is given by [8]

R=0.05×0.069/0.119=0.029 ohm.

The armature current equals the sum of the line current and the shunt field current. Assuming the shunt field current to be 4.6 amperes as obtained in **Question a**, the armature current equals 80+4.6=84.6 amperes. The series field current (I_s) is then given by [11]

I_s=84.6×0.029/0.05=49.1 amperes.

The series field mmf. equals 30×49.1, or 1,470 ampere-turns. The shunt field mmf. equals 1,000×4.6, or 4,600 ampere-turns. The demagnetizing mmf. of the armature equals 84.6×600/134.9, or 376 ampere-turns. The net mmf. then equals 1,470+4,600—376=5,694 ampere-turns.

The armature voltage (E_a) corresponding to 5,694 ampere-turns (Fig. 14) is 237 volts. The terminal voltage (V_t) is then given by [3]

V_t=237—0.08×84.6—0.05×49.1
=227.8 volts.

The assumed value of the shunt field current (I_f) must be checked by [6]

I_f=227.8/50=4.56 amperes.

Since this value checks the assumed value of 4.6 very closely, the terminal voltage (227.8 volts) may be taken as the correct value.

The terminal voltage corresponding to any other value of line current may be calculated in the same manner and sufficient points may be determined for the construction of the external characteristic of the compound generator.

It should be noted that while the armature voltage at full load (**Question a**) is 244.7 volts, the armature voltage at no load is only 211 volts, showing the effect of the series turns at full load.

The voltage regulation ($V.R.$) of this generator is given by [30]

$V.R.$ = (210.6 — 230) 100/230 = — 8.4 per cent.

The minus sign indicates that the terminal voltage decreases when the load is removed. A compound generator of this kind is said to have a "rising characteristic," or to be "over compounded." By decreasing the shunt field resistance, or by decreasing the series field shunt resistance, the voltage regulation may be made zero or positive, and the "external characteristic" may be made "flat" or "drooping."

The "flat characteristic" is used when

it is desired that the terminal voltage remains constant independent of the load as in the case of a lighting load located within a short distance from the generator. The "rising characteristic" is used when it is desired that the terminal voltage increase with the load, as in the case of a lighting load located at some distance from the generator. In the latter case the characteristic should have such a shape that as the load increases the rising terminal voltage will just compensate for the resistance voltage lost in the wires conducting the current to the distant load so that the voltage at the lamps will remain constant independent of the load.

SOLUTION OF PROBLEM 65.

Answer to Question a.

If the low-tension winding of a transformer is delivering no current, the necessary impressed voltage on the high-tension side, V_1, is equal to the low-tension voltage, V_2, multiplied by the ratio of transformation, a.

That is, $V_1=aV_2$.

If the low-tension winding is short-circuited the impressed voltage on the high-tension side necessary to send a certain current through it is the equivalent impedance volts. (See Problem 64.) Under any condition of load a certain part of the voltage impressed on the high-tension side, viz., the equivalent impedance volts, is necessary to send the current through the windings. If the voltage of the low-tension winding is V_2 when it is delivering load it will be necessary to impress on the high-tension side a voltage great enough to produce V_2 on open circuit plus that necessary to send the required current through the windings.

That is: $V_1=aV_2+I_1Z_1$.

It is not the numerical sum of these voltages since we are dealing with alternating quantities, which must always be added vectorially. I_1 is the current in the high-tension winding and Z_1 is the equivalent impedance of the transformer on the high-tension side.

The regulation of a transformer is defined as the percentage rise in voltage when the load is removed. If the low-tension voltage is V_2 for a certain load (unless otherwise stated V_2 is assumed to be the rated low-tension voltage) the necessary high-tension voltage is V_1, as calculated above. If the load is removed from the low-tension side, that voltage becomes equal to the high-tension voltage divided by the ratio of transformation and is V_1/a. The regulation of a transformer is thus equal to

$$\frac{\frac{V_1}{a}-V_2}{V_2}\ 100 \text{ per cent}$$

In order to find the high-tension voltage when the transformer delivers 500 kilowatts it is necessary to draw a vector diagram.

By [1a] $I_2=500{,}000/2{,}200\times1.0$
$=227$ amperes.

The ratio of transformation is 11,000 to 2,200, or 5.

$I_1=227/5$
$=45.4$ amperes.

Fig. 13a.

The equivalent impedance on the high-tension side is

$Z_1=347/45.4$
$=7.63$ ohms.

The equivalent resistance on the high-tension side is

$R_1=3{,}380/45.4^2$
$=1.63$ ohms.

By [5a] $X_1=\sqrt{7.63^2-1.63^2}$
$=7.45$ ohms.

The horizontal component of V_1 is:

By [19a] $5\times2{,}200+45.4\times1.63$
$=11{,}074$ volts.

The vertical component of V_1 is

45.4×7.45
$=338$ volts.

By [20a] $V_1=\sqrt{11{,}074^2+338^2}$
$=11{,}079$ volts.

$$\text{Regulation}=\frac{\frac{11079}{5}-2200}{2200}\ 100$$

$=0.74$ per cent.

Answer to Question b.

The current on the low-tension side is,

By [1a] $I_2=400{,}000/2{,}200\times0.80$
$=227$ amperes.

The high-tension current is also the same as before and is 45.4 amperes.

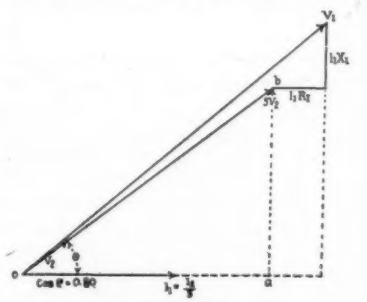


Fig. 14a.

The component of $5V_2$ along the current is

$5\times2{,}200\times0.80$
$=8{,}800$ volts.

The component of $5V_2$ perpendicular to the current is

$5\times2{,}200\times0.60$
$=6{,}600$ volts.

The component of V_1 along the current is

By [19a] $8{,}800+74$
$=8{,}874$ volts.

The component of V_1 perpendicular to the current is

By [19a] $6{,}600+338$
$=6{,}938$ volts.

By [20a] $V_1=\sqrt{8{,}874^2+6{,}938^2}$
$=11{,}270$ volts.

$$\text{Regulation}=\frac{\frac{11270}{5}-2200}{2200}\ 100$$

$=2.45$ per cent.

Answer to Question c.

The efficiency of a transformer, like any sort of apparatus, is the ratio of the power output to the power input. The input equals the output plus the losses. These consist of the core loss and the copper loss. The former is measured on open circuit and the latter is measured on short-circuit. With one winding open-circuited the power supplied to the other winding is the core loss plus a very small copper loss in that winding. This is so small that it is commonly neglected. The core loss is commonly assumed to be constant, although it does vary slightly. With one winding short-circuited the power supplied is copper loss plus a very small core loss which is commonly neglected. The copper loss in a transformer is calculated by multiplying the equivalent resistance on either side by the square of the current on the same side.

By [1a] $I=125{,}000/11{,}000\times1.0$
$=11.36$
Core loss$=2{,}950$ watts.
Copper loss$=11.36^2\times1.63$
$=211$ watts.
Total loss$=3{,}161$ watts.
Efficiency$=125{,}000/(125{,}000+3{,}161)$
$=97.55$ per cent.

Answer to Question d.

Core loss$=2{,}950$ watts.
Copper loss$=45.4^2\times1.63$
$=3{,}360$ watts.
Total loss$=6{,}310$ watts.
Efficiency$=500{,}000/(500{,}000+6{,}310)$
$=98.80$ per cent.

Answer to Question e.

Core loss$=2{,}950$ watts.
Copper loss$=45.4^2\times1.63$
$=3{,}360$ watts.
Total loss$=6{,}310$ watts.
Efficiency$=400{,}000/(400{,}000+6{,}310)$
$=98.50$ per cent.

Answer to Question f.

The all-day efficiency equals the total kilowatt-hour output divided by the total kilowatt-hour input for 24 hours. The core loss is being supplied all of the time that the transformer is connected to the supply circuit. The copper loss is only present when the transformer is delivering power. The core loss for 24 hours is

$24\times2{,}950$
Core loss$=70.8$ kilowatt-hours.

During the first period the current on the high-tension side is

By [1a] $I_1=500{,}000/11{,}000\times0.95$
$=47.85$ amperes.

Copper loss during 4 hours:

$=47.85^2\times1.63\times4/1{,}000$
$=14.93$ kilowatt-hours.

During the second period the current on the high-tension side is

DIRECT CURRENTS.

Problem 16.

Two shunt generators, A and B, are to be operated in parallel. The external characteristics of these generators may be represented by the equations, $V_A = 600 - 0.2I_A$ and $V_B = 580 - 0.1I_B$, where V_A and V_B represent the terminal voltages and I_A and I_B represent the line currents of the respective generators. Each machine can deliver continuously a current of 300 amperes without overheating.

Find (a) the line voltage when the line currents of the two machines are equal; (b) the line current of each machine when the total line current is 300 amperes; (c) the maximum power output of the two machines operating in parallel, and (d) the line voltage when no load is connected to the line wires.

This problem illustrates the effect of the external characteristics upon the division of load between two shunt generators operated in parallel.

ALTERNATING CURRENTS.

Problem 66.

A 25-kilovolt-ampere, 60-cycle autotransformer has a ratio of transformation of 660 to 220 volts. The core loss at the rated voltage is 368 watts. If the low-tension winding is short-circuited and 29.5 volts is applied to the high-tension winding, the current on this side is 40.2 amperes and the power is 348 watts. This transformer takes 22 kilowatts at 0.85 power-factor from a 660-volt circuit. (a) What are the currents on the high- and low-tension sides? (b) What power is delivered on the low-tension side? (c) What is the voltage on the low-tension side? (d) What is the power-factor on the low-tension side? (e) What is the efficiency of the transformer at this load?

This problem illustrates the calculation of the performance of an autotransformer.

Solutions of the above problems and two new problems will be printed in the next issue.

By [1a] $I_1 = 350{,}000/11{,}000 \times 0.88$
$= 36.2$ amperes.
Copper loss during 6 hours
$= 36.2^2 \times 1.63 \times 6/1{,}000$
$= 12.8$ kilowatt-hours.
Total loss in 24 hours
$= 70.8 + 14.93 + 12.8$
$= 98.5$ kilowatt-hours.
Total output $= 4 \times 500 + 6 \times 350$
$= 4{,}100$ kilowatt-hours.
Efficiency $= 4{,}100/(4{,}100 + 98.5)$
$= 97.5$ per cent.

Tests for Impurities in Storage-Battery Electrolyte.

If a test for impurities was made with every batch of fresh electrolyte, and at regular intervals with cells in use, there would be much less deterioration and trouble from storage batteries.

The following tests for the acid used with lead cells were selected after trying a multitude of others, many of which were lacking in either accuracy or speed, and they are believed to be both reliable and rapid, and suited to every-day use.

Test for Hydrochloric Acid (Chlorine).—To a small quantity of electrolyte add a few drops of nitric acid (HNO_3) and then add two or three drops of silver nitrate ($AgNO_3$). The formation of a white cloudy precipitate indicates the presence of chlorine in some form.

Test for Nitric Acid.—A very sensitive test for nitric acid is to mix a solution of diphenylamine ($NH(C_6H_5)_2$) in concentrated sulphuric acid (H_2SO_4) and add it to the sample under test; the presence of nitric acid will be indicated by a blue color.

Test for Iron.—Heat a test tube of dilute electrolyte to the boiling point, add several drops of concentrated nitric acid (HNO_3) and boil again. Repeat this operation two or three times. When solution is cold add a few drops of potassium sulphocyanide (KCNS), which will color the solution a deep red if there is any iron present.

Test for Copper.—To a diluted solution of the electrolyte add ammonium hydrate (NH_4OH) or commercial ammonia until the resultant mixture is alkaline to litmus paper. A deep blue color indicates the presence of copper.

Test for Arsenic.—To a dilute solution of the electrolyte add an equal portion of hydrogen-sulphide solution (H_2S). A yellow precipitate indicates the presence of arsenic.

The presence of lead in the electrolyte does no harm.

The specific gravity will be near 1.200 for power batteries and as high as 1.300 in portable cells for testing and electric autos.

The advantage of high specific gravity is low resistance, but there is great danger of the plates being injured by sulphating if the specific gravity is run too high. H. E. Weightman.

St. Paul Street Lighting.

At a conference on December 8 in St. Paul, Minn., attended by Coucilman Keller, Purchasing Agent August Hohenstein, V. H. Roehrich, director of the city testing laboratories, Paul Doty, manager of the St. Paul Gas Light Company, and F. A. Otto, the gas company's electrical engineer, a three-cent per kilowatt-hour basis for street lighting in St. Paul was practically agreed on. The discussion involved the relative merits of carbon arcs, flaming arcs, and nitrogen-filled lamps, which Councilman Keller insists on having installed and Mr. Doty has opposed.

By the tentative agreement reached, all the lighting will be included in one contract, and will include about 425 of the nitrogen lamps to be installed, about 500 flaming arcs, and about 800 carbon arcs. On account of the extra expense involved in replacing old lamps with new nitrogen-filled lamps, Mr. Doty asked a higher rate for current. The tentative agreement will, however, permit the city to install the new lamps at only a slightly increased expense.

Chicago Jovian League.

Frederic P. Vose addressed the Chicago Jovian League on December 14, discussing principles of salesmanship, and the humane element in business transactions. He referred also to telephone conversations and the discourteous attitude which is often, unintentionally, assumed when conversing over the telephone. The manner of receiving business visitors in offices is also of more importance than generally realized. Not enough attention is given this detail.

Corn-Cobs for Fuel.

A. L. Carpenter, owner of the lighting plant at Uniontown, Ky., has made a contract with the Wabash elevator by which he takes all the corn-cobs from the elevator for use as fuel for his plant, the arrangement meaning a big saving.

INSULATOR DEPRECIATION AND SPARK-OVER VOLTAGES.

Monthly Meeting of the American Institute of Electrical Engineers.

The 302nd meeting of the American Institute of Electrical Engineers was held in the Engineering Societies Building, New York City, on the evening of December 11. President Paul M. Lincoln called the meeting to order at 8:20 p. m. Two papers were presented. The first, by F. W. Peek, Jr., was entitled "Effect of Altitude on the Spark-Over Voltages of Bushings, Leads and Insulators." The second, by A. O. Austin, was entitled "Insulator Depreciation and Effect on Operation."

Effect of Altitude on Spark-Over Voltages.

The dielectric strength of air decreases with decreasing pressure and increasing temperature; that is, with decreasing density. Therefore, at high altitudes where the barometric pressure is low, brush discharge starts and spark-over takes place at lower voltages than at sea level. The effect of air density on corona, and spark-over between spheres, etc., has been given in previous papers. In the present investigation the effect of altitude and temperature on the surface spark-over of leads and insulators was studied by placing them in a large wooden cask and gradually exhausting the air. Correction factors are given for various standard types. The spark-over voltage decreases almost directly with the air density. An idea of the magnitude of the correction is given by the fact that a string of insulators with a spark-over voltage of 300 kilovolts at sea level has a value of 250 kilovolts at an altitude of 5,000 feet and 205 kilovolts at 10,000 feet.

The spark-over voltage of insulators will vary somewhat from day to day, due to humidity. The humidity voltage variation on the insulator is possibly as high as 7 per cent. There is also some variation for different units. Comparative tests of different types, when desired, should be made at the same time. The humidity correction, on the insulator itself, is too complicated to make and of no practical value. Care must be taken, however, to use a measuring gap unaffected by humidity; that is, a sphere gap.

Insulator Depreciation and Effect on Operation.

Investigation shows that insulator trouble increasing with time is not due to fatigue in the material under applied working loads, but rather to depreciation caused by the absorption of water by porous material or by the cracking of the dielectric from high internal mechanical stress set up by uneven temperature in the dielectric, or by greater expansion of cement or metal, or stress from a combination of these. The shape of the dielectric may cause high maximum stresses under comparatively mild conditions, necessitating the working of material with a lower factor of safety than that permissible even in steel work. The high maximum internal stress under which insulators operate will cause considerable depreciation in some types through cracking, necessitating a careful study of the effect of depreciation upon the operation of the system. Trouble comes largely through the matching up of faulty parts so that the remainder of the insulator will be destroyed by a comparatively mild surge. Applying the theory of probability, it is then possible to obtain a relative operating hazard for the insulator under the same conditions or for varying degrees of depreciation. An equation for the operating hazard is developed which gives a good idea of the relative economic importance of the number of sections in the insulator, the magnitude of the switching surge and the rate of depreciation as affecting the reliability of the system. The study of depreciation shows that routine tests which will tend to eliminate future depreciation, or refinements in the mechanical features of the insulator, are of far more importance in producing reliability than the designing of insulators to withstand extremely severe dielectric design tests, for insulators which may have extremely high dielectric strength will cause trouble through cracking from internal stress.

The discussion was opened by H. L. Curtis, who described the method of measuring the leakage over the surface of insulators used at Bureau of Standards. The samples used were 10 centimeters square by one centimeter thick, and the leakage taken between strips placed one centimeter apart. Measurement was made by means of a galvanometer, with direct voltages up to 500 volts. The results showed that surface leakage is affected but little with temperature and voltage, but that for most insulators there is very great change depending upon the atmospheric humidity. In the case of hard rubber which had deteriorated with light, this change was as great as the factor 10^{11}. With waxy materials, such as paraffin and beeswax, the change is very slight. For the majority of materials the change is large, and generally of an order of a million times.

David B. Rushmore said that the insulator problem must be solved by a scientific study of cement and porcelain. He referred to the uncertain value of a ground wire, and pointed out the necessity, from both engineering and commercial standpoints, of determining quantitively what its value is. This cannot be determined by practical experience, but may be done by laboratory investigation.

E. D. Eby said that both corona and spark-over voltages vary directly as the density of the air, and consequently have the same relative values at all densities. An altitude rating is, therefore, logical and necessary. He had adopted this two years ago in connection with transformer bushings, and has been applying it since. Altitudes practically encountered do not exceed 10,000 feet. A dividing line was set at 4,000 feet, with ratings for leads for both higher and lower values. With the usual factors of safety in the design of leads, bushings and insulators, voltages of line frequency would seldom, if ever, tax well designed apparatus. It is voltages of high frequency that are of chief importance, and under these conditions different designs of leads and insulators perform differently.

P. W. Sothman touched upon the importance of the insulator in line construction, and the question of the desirability of drawing up rigid specifications for insulators and insulator testing. Heretofore we have been unable to duplicate in laboratory tests the conditions which are encountered in practice. Insulators which pass factory tests are found to break down in service. This is partly due to other line conditions and the insulators have a factor of safety higher than some of the other elements involved. The porcelain manufacturers have made great improvements in the quality of the porcelain which is now produced, but he did not consider the present output in this country as good as the porcelain which is imported from Europe. The percentage of failures today is very much less than it was three or four years ago.

Selby Haar inquired as to whether there was any relation between electrical and mechanical stresses in a strain insulator. He thought strain insulators should have more sections than suspension insulators, but it is hard to prove that this is necessary.

Charles P. Steinmetz said that for many years the insulator was the weakest link in the transmission system, but it is not so today. This is evidenced by the increase in number of breakdowns of other parts of the system which were formerly protected by the failure of insulators. The present condition is preferable, since breakdowns in the stations can be easily located. The principal problem now is the proper testing of line insulators and weeding out defective ones. They must be tested both for electrical and mechanical strains. Electrical breakdowns come not from normal voltage and frequency, but from high-frequency surges. High-frequency testing has one serious danger, since it usually involves the use of electrical resonance, which gives an indefinite voltage, and the result is mainly a question of the power back of it. High-frequency tests should be made by a high-frequency oscillating-current generator, giving a definite voltage. Conditions for making mechanical tests are not so favorable. He referred

to the testing of glass for mechanical strain by the use of polarized light, and suggested that a similar method might be found for porcelain. Depreciation of insulators should be taken care of by testing insulators in service and eliminating the defective ones. This is in addition to other methods, such as careful study of the design of the insulator and the material of which it is made. Greater reliability of service can also be given by increasing the number of units in the insulator and by reducing surging on the line.

E. E. F. Creighton corroborated the statements of Mr. Austin regarding advances made in the design of insulators. He referred to other methods of testing. The megger can be used where moisture has entered cracks in the porcelain, but it is useless where the cracks do not extend all the way through. He had tried a direct-current test at high voltages with little success. Tests with a high-frequency transformer will show trouble whether the fault is due to small flaws or to underfiring. It is harmless to good porcelain.

Farley Osgood said, in respect to the value of an overhead ground wire, that it should be considered not only from the insulating and protective standpoints, but from the standpoint of its value in assisting in the location of defective insulators. When figuring on the cost of the transmission line, this should be considered. His experience was that the ground wire was well worth its cost.

F. W. Peek, Jr., agreed with Mr. Austin that most insulator failures are started by mechanical flaws and cracks. These cracks are extended by each electrical impulse of sufficiently high value until finally puncture results and the final failure is electrical. Failures may be classed as manufacturing or operating. Manufacturing causes of failure are poor designs, porous porcelain, and defective mixtures. Operating failures are caused by an insufficient number of units, by switching, and by improper selection of insulators. The most important thing in selecting insulators is careful inspection. Where the percentage of failures from one burning is larger than two or three per cent, the entire lot should be condemned, or at least be regarded with suspicion. More troubles occur on lines with operating voltage under 40,000 than upon high-voltage lines. This is because the insulators are selected to withstand the operating voltage rather than the voltages due to lightning and other causes. Gradually deterioration results. In certain parts of the country, where the number of units in a string exceeds seven or eight, there is almost no trouble. Trouble on low-voltage lines could be avoided by using a larger number of units and better insulators. He then referred to the impulse test for insulators which as carried out at Schenectady could be applied at definite voltages for times as short as one millionth of a second. The voltages are measured by means of a sphere gap. Distinctions should be made between high-frequency tests of different kinds, as the breakdown voltages at 60 cycles, 100,000 cycles, and with single impulses are found to be entirely different.

Mr. Austin then closed the discussion. Little attention had been paid to altitude in considering the reliability of insulators, since if the insulator protects the line from lightning by flashing-over at sea level, it will also do so at higher altitudes. It then has a larger factor of safety. On account of the rate at which cost of station insulation goes up with the degree of protection, a lessening of the safety factor would be desirable. Trouble was formerly largely on the line, but is now being forced into the station, and the systems of protection there will undergo a considerable improvement in the next few years. In early installations, the effect of resistance in damping out surges was important. There are many systems where the insertion of resistance at certain points would be a great help in damping high-frequency surges. Other systems cannot be benefited in that way. In some systems, with low resistance, arcing grounds are decidedly serious as compared to the earlier systems. With the enormous amounts of power back of modern systems, the amount of damping in a circuit is highly important. Regarding the combination of mechanical and electrical stresses, he thought there is some combined action between them, and electrical failures are of a mechanical nature, anyhow, since the particles are forced apart along the path of the disruptive discharge. As the strength of insulators is increased, it becomes more difficult to obtain perfect material. The oscillating transformer will weed out certain classes of defective insulators, but there are others which must be weeded out by some other means of test. Regarding a ground wire, he said that there are cases where it has great value as a protection, but there are insulators made today which do not need any protection of this kind. If the cost of a ground wire is put into improved insulators it would decrease the number of interruptions materially.

The meeting then adjourned and was followed by a smoker.

Great Falls Hydroelectric Plant for District of Columbia Will Require Three Million Dollars.

In the annual report of the chief engineer of the United States of America, Gen. D. C. Kingman, estimates that the preliminary work on the Great Falls power project and for increasing the water supply of Washington, D. C., will require $3,000,000. The appropriation, if made, is to be applied to the acquisition of land and water rights, purchase of material and other expenses. General Kingman says that the money proposed to be expended upon the power plant property is to be furnished entirely by the United States, and only the part relating to the water supply of the project will be appropriated on the share and share principle. Inasmuch as the United States is the largest consumer of power from the project it is presumed that the government should logically assume control of the plant, as was done with the Washington aqueduct.

Wireless Outfit for Detecting Storms.

The utilization of an amateur wireless receiving set to detect the approach of thunder storms for the benefit of linemen working on high-tension circuits, is employed by Francis D. Coleman, superintendent of the Bonny Eagle generating station of the Cumberland County Power & Light Company, Portland, Me. About two years ago Mr. Coleman installed a wireless apparatus, chiefly to provide diversions in the long winter evenings, the station being in an isolated locality. In experimenting he found it possible to "hear" distinctly the arc when electrolytic lightning arresters were being charged at any of the company's stations, the farthest 23 miles distant.

Thunder showers may readily be detected two or three hours away, although one cannot be sure where the storm will center. An alarm might easily be arranged with a coherer and bell circuit. The ability to secure government weather reports also by wireless is appreciated in locations of this sort.

Hopkinsville Plant Completed.

The new power plant of the Kentucky Public Service Company at Hopkinsville, Ky., has been completed and put in operation, service having been cut over from the old plant. The new plant is modern and capable of extension when need arises. It will furnish current not only for Hopkinsville, but for Pembroke and Trenton, Ky., and Clarksville, Tenn.

The Board of Public Utilities Commissioners of the Philippine Islands has decided that it has no jurisdiction over the public utilities owned by a province or a municipality.

ELECTRICITY ON BOARD SHIP.

The Aquitania's Equipment.

The address of the chairman of the Scottish Local Section of the Institution of Electrical Engineers, James Lowson, dealt with the use of electricity on ships. One of the principal sections of the address related to the installation on the *Aquitania*, with which he had had to do. He said that electricity was used even in the preliminary operations of the construction of the vessel. Fourteen Arrol electric derrick cranes were erected along both sides of the building berth and when she came to be launched the same power was used for releasing the triggers of the launching gear, as well as the mechanism for breaking the ceremonial bottle of wine against the side of the ship. The size of the ship was 901 feet by 97 feet by 64 feet, overall, and in this space an enormous amount of electric power and appliances were provided. With a crew of 973 and passengers numbering 3,230 she carried 4,203.

The equipment comprises four Westinghouse generators, 400 kilowatts, 1,000 revolutions, 250 volts—direct-current turbo sets with slip rings and static balancers for three-wire distribution.

The generators are fitted with Westinghouse radial commutator and ventilated brushgear. To ventilate the generators air is conveyed in sheet-steel ducts from the top deck. The three-wire system using 110 volts between neutral and outers is in use, the chief reasons for its adoption, apart from saving of copper on feeders, being the reduction in the size of commutators in generators and motors; the higher efficiency thus rendered possible; and the fact that the number of brushes for each machine was approximately half the number needed with 110-volt machines, and in consequence less attention was required. With radial commutators and carbon brushes, said Mr. Lowson, the friction was greatly reduced. He said that as electric power driving of auxiliaries increased, the tendency was towards 440 volts pressure, and with this voltage there should be no greater danger on board ship than there was in land installations, if the wiring was of the highest grade. The main switchboard was 44 feet long and it was designed for the control of four generators, together with their static balancers, 10 feeder circuits for lighting, and 14 feeder circuits for power. For each generator there were two circuit-breakers of 3,000 amperes capacity, fitted with time-lag attachment of the overload release. One of each pair of the breakers was also fitted with an adjustable release to open circuit instantaneously with the reverse current of 10 per cent, and in addition it could be opened or closed electrically from a hand-controlled switch placed on center of the board. The breakers could also be operated by hand. The middle-wire feeders were coupled direct to the neutral busbar through ammeter shunts, and each neutral feeder was connectd to its own central-zero ammeter.

Power was transmitted from the main switchboard to a number of 220-volt auxiliary switchboards and also to 10 three-wire auxiliary switchboards for 110-volt supply. These boards were placed at different positions on the port and starboard sides and cross-connecting cables were fitted so that in the event of one section failing the supply could be maintained from the other side.

Approximately the total length of the single wires installed amounted to 135 miles, and of standard and multiple cable 65 miles, making in all some 200 miles of wire and cable laid from stem to stern. The gross weight of all wires, including insulation, was estimated to be about 50 tons and the total weight of copper about 25 tons. In round figures, 90,000 porcelain insulators and 100,000 screws were used.

There were altogether 173 motors installed, aggregating 2,265 horsepower. There were also 10 shoe-winch connections of 100 amperes each. The cables for these motors were for the most part erected on insulators, and with one or two exceptions all motors were wound for 220 volts and connected to the outers of the three-wire system.

Metal-filament lamps had been used throughout, except in the engine rooms, boiler rooms and stores, and for portable lamps and clusters. The total number of lamps fitted was close upon 10,000 at 110 volts, the load being as nearly as possible balanced. In addition there were 10 lifeboat lamps placed along each side, lighting the boat deck, and when required these lamps could be inclined outwards to throw light down the ship's sides. These lights were operated by contactors, controlled by switches placed on the bridge. There were also four connections for 100-ampere searchlights.

Two electrically controlled whistles were fitted on the funnels, and these whistles were equipped with an electric time-control on the Willett-Brun system, whereby they were blown automatically at frequent intervals during foggy weather.

An Evershed patent electric helm indicator showed on the bridge every movement of the rudder and its angular position in degrees. The two-horsepower motor used on the gyroscope was operated in connection with the instrument for recording oscillations of the ship. A submarine signaling apparatus was fitted, the receivers being placed in a small telephone cabinet on the bridge. Among other appliances there was the Kelvin motor-driven sounding machine which indicated directly in view of the navigating officer the depth of water.

The emergency generating plant was one of the many precautions taken to ensure safety. A separate circuit of 700 lights was connected to the emergency set and these lights were distributed throughout public rooms and passages on ten decks, so that in the event of the main generating plant failing, sufficient light would be provided to enable passengers and crew to find their way about.

The Marconi installation on the *Aquitania* was situated on the boat deck amidships and was designed to provide a working range by day of 650 miles over open water when employed with an aerial having a mean height of 130 feet. The maximum range by night under favorable conditions would be at least twice that by day. The aerial consisted of four parallel wires evenly spaced on ash suspenders and stretched between the masts.

One other interesting inovation on board was two Thornycroft motor boats fitted with Marconi wireless installations by which they could communicate with other vessels when afloat. The aerial wires were carried on two 25-foot bamboo masts which could be lowered on to the decks when not in use. The receiving range for these boats was 300 miles.

Electric Heating Activity in England.

Manufacturers of electric cooking and heating apparatus in England are passing through a period of greater activity than they have ever before experienced. Not only have all Continental supplies been stopped by the war but the demands of the British Government have been heavy. The principal reason for this is the preparation necessary for adding to the comfort on board the many warships in the wintry conditions which have already set in in the North Sea. All kinds and shapes of heaters, luminous, converter and fire types, are being made use of, and electric cooking apparatus is also a convenience and necessity in destroyers, submarines, etc.

The Admiralty orders have lately occupied a number of the leading apparatus firms and the latter have been turning these requirements out as fast as they can, still without keeping pace with demands. Not only in the Navy, but also in some places along the line in France where the Army authorities are quartered, electrical warmth is being welcomed. In England in a number of the camps that have been laid out as training grounds for Lord Kitchener's new army, electric cooking equipments have been installed. Special facilities are afforded by local supply authorities for cheap electricity for the lighting and other needs of such premises and opposition to overhead wires for temporary supply, which would have been objected to in normal times, disappears at such a time.

Chicago Section, Electric Vehicle Association.

The discussion on ways for increasing commercial electric vehicle sales in Chicago was continued at the meeting of the Chicago Section, Electric Vehicle Association of America on December 15. The committee appointed to compile statistics on local co-operative advertising reported that, assuming the Commonwealth Edison Company would pay one-half the total cost of the campaign, the expense to the companies participating would be about $2,000 per month. This is figured on the basis of a campaign of about the extent carried on by the passenger-car interests. A direct mail campaign to a list of 5,000 selected names would also cost about $2,000 per month, if one piece of literature was sent out each month. A billboard campaign which could supplement either of the above would also approximate $2,000 monthly.

D. E. Whipple outlined a campaign which two passenger-car manufacturers were conducting jointly in Chicago. A list of high-price gas car users is obtained and letters and literature pertaining to the electric sent to each, pointing out how the electric can be used in conjunction with a gasoline car. Mr. Whipple thought the same plan could be adopted by commercial vehicle interests. He held that the present user of either gasoline or electric vehicles is a good prospect for future electric vehicle sales.

There was also a further general discussion of the matter of exchanging prospects between electric vehicle salesmen and other topics of local interest. The question of truck speeds was brought up and while it was advocated that the speeds of heavy gasoline cars be limited to 10 or 12 miles per hour, it was the consensus of opinion that electric vehicle speeds for the lighter types of cars be increased.

Winter Experience with Electric Vehicles.

The Electric Vehicle Association of America, 29 West Thirty-ninth Street, New York City, has some very interesting data relative to the behavior of the electric vehicle in winter service, which will be sent those interested upon request.

Last winter offered many striking illustrations of the dependability of motorized delivery wagons, which did the regular work with little or no delay; the value of the service rendered more than justifying their purchase.

The motor mail wagons operating last winter in the face of well-nigh impassable snowdrifts, had perfect scores. This was also the experience of department stores, express companies and breweries which operated electric vehicles.

Co-Operative Garage for Electric Vehicles in New York.

The often talked of plan of a co-operative garage for electric pleasure vehicles has become a reality with the signing of a lease by the New York Electric Vehicle Association for a building on the southwest corner of Central Park West and Sixty-second Street. A number of the leading manufacturers of electric pleasure vehicles are co-operating with the New York Electric Vehicle Association in this undertaking and all concerned are sparing no efforts to make it a big success. The Rauch and Lang, Detroit and Baker Companies will have showrooms in the building, making it their headquarters.

The garage will start in with accommodations for 150 cars, of which more than 100 have already been secured. It is planned there will be a fixed charge of $45 a month, which will include battery charging, care of the car and taking the car to and from the owner's residence to the garage.

The object of the plan is to provide a large, centrally located garage where electric pleasure cars will have a home of their own and receive special care and attention.

Philadelphia Vehicle Section Meeting.

The regular December meeting of the Philadelphia Section of the Electric Vehicle Association of America was held on Wednesday, December 9, at the Colonnade Hotel, at noon, with luncheon preceding.

A paper was presented by George O. Simpson, of the B. F. Goodrich Company, on the subject of "Silvertown Cord Tires." Mr. Simpson gave a very interesting talk on the early history of the production of rubber and followed by a lucid explanation of the construction and manufacture of the Silvertown Cord Tire. He explained the improvements that have been made in it and why it is superior to the ordinary fabric-wrapped tires of similar construction. Discussion of the paper was entered into by A. W. Young, W. H. Metcalf, J. C. Bartlett, W. E. Bevan, F. E. Whitney and others.

This is the first meeting that has been held in the daytime, and a resolution was adopted endorsing the experiment and instructing that the January meeting be held similarly.

Electric Club of Chicago.

William R. Moss, an attorney of Chicago, was the speaker at the weekly meeting of the Electric Club of Chicago on December 10. Mr. Moss spoke on the subject of "Co-operation," pointing out the value of meetings such as the club holds.

Council Meeting of Illuminating Engineering Society.

At a meeting of the Council of the Illuminating Engineering Society held December 10, 1914, an extensive report of the status of illuminating-engineering education in the colleges of this country was received from the Committee on Education. The report included (1) a summary showing the extent of instruction in laboratory work in illuminating engineering at 39 colleges; (2) a complete curriculum for a four-year undergraduate course leading to an illuminating-engineering degree; (3) a one-year undergraduate adjunct course; (4) a one-year post-graduate course; (5) a classified list of books in English, pertaining to illuminating engineering. The report is to be printed for distribution later.

The following resolution was received from the Committee on Nomenclature and Standards and approved by the Council:

Resolved, that it is the opinion of this Committee

(*a*) That the output of all illuminants should be expressed in lumens,

(*b*) That illuminants should be rated upon a lumen basis instead of a candlepower basis,

(*c*) That the specific output of electric lamps should be stated in lumens per watt and the specific output of illuminants dependent upon combustion should be stated in lumens per British thermal unit per hour.

The Exhibition Booth Committee (Electric) submitted a report giving the conditions under which the Society's series of booths, which were designed to present in an attractive way the fundamental principles of good lighting, may be obtained for display in show rooms of central-station companies, at conventions, expositions, etc.

The following appointments to the Research Committee were confirmed: E. B. Rosa, chairman; P. W. Cobb, E. C. Crittenden, Preston S. Millar, G. W. Middlekauff, P. G. Nutting, F. K. Richtmyer, H. E. Ives, E. F. Kingsbury, E. P. Hyde, C. E. Ferree, C. H. Sharp, and W. E. Wickenden.

Boston Vehicle Club Meeting.

The Electric Motor Car Club of Boston met at dinner on December 9, with about 35 members present. Edwin D. Sibley, professional entertainer, read some pleasing selections from his own writings. A testimonial, in the form of a rising vote of thanks, was tendered Day Baker, the retiring president of the Club, who for three years served the organization in that capacity.

Mr. Baker feelingly responded to the resolutions.

A new member, George B. Lipphardt, of the American Express Company, Boston, was voted in.

New Electrical and Mechanical Appliances

Mazda-Lamp Fixtures for Street-Lighting Service.

The introduction of high-candlepower gas-filled Mazda tungsten lamps and the new conditions under which they operate required the design of an entire new line of fixtures to accommodate them properly. The several specific reasons that have induced the development of these distinctly different types of fixtures are the following:

(1) The intense brilliancy of the lamp filament requires that the light source be screened in order to obviate all the disadvantages from glare.

(2) The lamp in operation is designed to reach a very high temperature, and it is essential that the fixture be so ventilated that it is maintained at a temperature which will do it no injury.

(3) The lamp must be protected from moisture and atmospheric changes.

(4) The shape and size of the bulb being different from that of previous standards of the vacuum lamp, it was necessary to make a fixture that would bring the light center to the correct location.

(5) Due to the fact that high-current series lamps operate at a very much greater efficiency, it is very desirable to provide an individual compensator in each lamp that will increase the current in the lamp from 6.6 or 7.5 amperes to 15 or 20 amperes, as the 400-candlepower lamps operate at 15 amperes and the 600 and 1,000-candlepower lamps at 20 amperes.

To provide for these contingencies, the General Electric Company has designed a complete line of street-lighting fixtures that fulfill every requirement. In general, these fixtures may be divided into three different classes, namely, bracket type, pendent type and ornamental type.

The bracket and centerspan suspension fixtures, which are almost universally known, have been redesigned to accommodate several kinds of reflecting equipment, such as the radial-wave reflector, concentric reflector or concentric reflector with prismatic refractor.

Novalux Unit With Compensator, Reflector, Diffusing Globe and Prismatic Refractor.

Novalux Unit (Form 2) With Concentric Reflector and Prismatic Refractor.

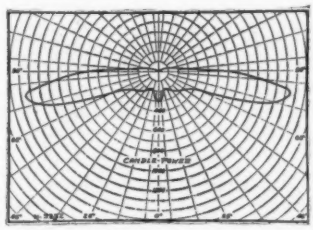
Novalux Ornamental Post.

The pendent units have been designed in two different classes, known as Form 1 and Form 2. The Form 1 unit has been designed to resemble the arc lamp in general contour and appearance. It has a very substantial construction throughout. These units can be furnished with an opal diffusing globe, an opal diffusing globe and concentric reflector, a prismatic refractor and clear globe, or a prismatic refractor.

The Form 2 pendent units are unique in appearance and cost less than the Form 1. They are arranged to use a diffusing globe, concentric reflector and diffusing globe, radial-wave reflector, or a concentric reflector and prismatic refractor. Both the Form 1 and Form 2 units are arranged to take a compensator, which is mounted under the dome and inside of the casing.

The ornamental Novalux unit has been designed to fill the demand for a highly ornamental unit where "white way" lighting is desired; and two different styles of ornamental units, known as the Forms 4 and 5, have been standardized.

Light distribution from a bare incandescent lamp is not suitable for street illumination. By using the various forms of fixtures equipped with reflectors and outer globes, the distribution, although at a decrease in specific consumption, is improved to such an extent that the illumination is much more uniform and more economical.



Distribution Curve Showing Effect of Refractor.

It was not, however, until the introduction of the prismatic refractor that the distribution from incandescent units could be so directed as to produce a decided maximum at an angle approximately 10 degrees below the horizontal. With such a distribution, it is now possible to increase the spacing of these lighting units without destroying the even illuminating effect that heretofore could only be accomplished with incandescent lamps by using a number of comparatively low-candlepower units.

The accompanying distribution curve gives a graphic idea of the improvement made by the prismatic refractor. The refractor used in these lamps consists of two sections, one fitting inside the other. The inner section is girdled by a succession of horizontal prisms,

which converge the light rays into the most useful zone; while the outer globe is lined with a series of vertical prisms, which serve to diffuse the light. The inner surface of the interior section and the outer surface of the exterior section are smooth; therefore, both sections when placed together with the top seam cemented present smooth outside surfaces, which facilitate cleaning, as the prismatic surfaces are sealed against dirt and dust.

All the fixtures described are suitable for all standard commercial circuits, both of the series and multiple types.

Red Devil Connector for Tying Wire.

When twisting wires together the electrician often wishes that he had four hands. There has been added to the well-known line of "Red Devil" tools an improved connector that in such work takes the place of two hands. This Red Devil connector will hold the wire as firmly as a vise, leaving the right hand free to make the twists. The tool is made to receive two round wires and hold them, either steel, iron, or copper, sizes Nos. 8, 10, 12 and 14. For use with larger wires or sleeves, special openings are provided to accommodate either iron, copper or aluminum wire.

Wire Connector.

It is also made for MacIntyre waterproof joints, Holtzer-Cabot seamless joints, or American Fuse Company joints. These are commonly known as MacIntyre sleeves, in which the wires are drawn together while the sleeve is slipped over the connector, thus holding it firmly during the twisting, and excluding water that would otherwise rust or corrode the wires.

This tool is made in the usual high quality that characterizes all Red Devil tools. It is spring-tempered from end to end. Unlike many connector joints with soft rivets, the Red Devil connector has a milled and counter bored joint, is hardened and carefully tempered and cannot get out of line. Thirty-eight different styles of these connectors answer every possible requirement of the lineman.

This connector has proven highly popular. It is only the resulting large sales that make it possible to put such a tool on the market at its exceptionally low price. The tool is manufactured by the Smith & Hemenway Company, Incorporated, 153 Chambers Street, New York City.

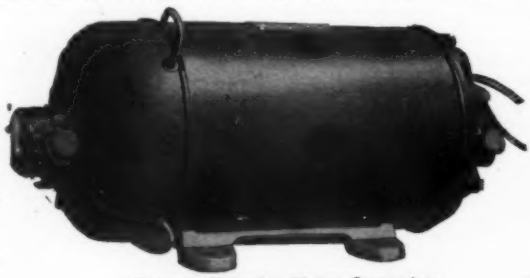
A Small Motor-Generator Set for Charging Storage Batteries for Gasoline Automobiles.

The small motor-generator set illustrated forms a convenient, economical and reliable means for charging automobile starting, lighting and ignition storage batteries. It consists of an alternating-current motor and a direct-current generator compactly mounted in the same frame. The motor operates from the 60-cycle, 110-volt supply circuit and drives the generator which furnishes the current for battery charging.

The generator is rated at 10 amperes and it can charge one or two six-volt batteries or one 12-volt battery. Its voltages can be regulated from 6.3 volts to 12.6 volts by means of a field rheostat.

The operation is very simple. Merely connect the motor lead to the circuit outlet and turn the snap switch. Adjust the generator to the desired voltage and connect with the battery. No attention or voltage regulation is required during charging. The generator is so wound that its voltage rises automatically at the end of the charge so that each cell then receives 2.5 volts.

The length of the set is 19 inches, width about 8 inches, height about 8.5 inches. The shipping weight is 140 pounds. The set is manufactured by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.



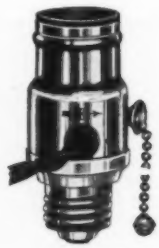
Battery-Charging Motor-Generator.

A Christmas Sales Opportunity.

The Leindorf Electric Light Company, Incorporated, Candler Building, New York City, has developed an adaptable portable light that presents an unusual opportunity to electrical supply jobbers and dealers for making a quick turn-over for a seasonable and practicable electrical gift. The portable is light, compact and durable; the base, swivel-joint and reflector are well assembled, and make a good-looking integral lighting unit. The portable may be clamped to the wall, fastened to the head board of a bed of any description, clamped on the back of a chair, fastened to the bookcase or mantel, and the manipulation of a concealed button causes all slack cord to disappear. It requires practically no work whatever to adjust the lamp to the right position both for convenience in placing the light and for keeping the direct rays of the lamp out of the eyes of the user. The company is making a special offer for the influencing of quick sales in unit quantities, and for a dozen or more an especially attractive price is made.

Pull-Chain Current Tap.

A new idea for a current tap has been originated by the Arrow Electric Company, Hartford, Conn. It consists of a pull socket with plug attachment cap and an outlet for an extension, the latter being controlled independently of the lamp in the pull socket. As shown in the accompanying illustration, the device is neatly and compactly arranged and makes a very handy outfit.



Current Tap.

Industrial Plant to Install Extensive Private Telephone System.

The relation of the telephone to efficiency in the management of the industrial plant has become so well understood that there is an ever increasing number of such plants using the telephone for expediting the carrying on of business routine. In recognition of this fact the J. I. Case Threshing Machine Company, Racine, Wis., is preparing to put in operation an unusually complete private telephone system.

This company operates an exceedingly large plant in Racine, the principal buildings of which are about a half a mile apart. In order to serve both parts of the organization in the most satisfactory manner, two complete switchboard equipments are to be installed. The switchboards, which will be of the central-battery private-exchange type, will each have an initial equipment of 80 lines with capacity for many additional lines to take care of future growth. Complete power plant, ringing, terminal and protective equipment will be used in connection with each switchboard.

The two private exchanges will be connected by means of trunk lines running in lead-covered cable. They will not, however, be connected to the city

telephone service, as the lines are to be used exclusively for internal business communications. Certain officials of the organization will, of course, require service outside of the plant and for this purpose a separate private-branch-exchange switchboard will be operated in connection with the local telephone company's lines.

Lead-covered cable will be used for the main distributing lines and twisted-pair telephone wire for the wiring from the distributing points to telephone instruments. Three thousand feet of 25-pair and 12,300 feet of 50-pair cable will be installed. There will be outside distributing points on the grounds, at which cable terminals will be located. Loud-ringing bells will be placed at various points inside and outside of buildings to call officials to the nearest telephone. These bells can also be used to sound alarms.

All telephone and construction material will be supplied by the Western Electric Company.

Entrance Switch and Stage Pocket.

The requirement of the National Electrical Code in regard to service switches is that these must be placed near to the point where the service wires enter the building and arranged so as to cut off the entire current. In some cities, particularly on the Pacific Coast, municipal ordinances require that means must be provided in the main public entrance to a building for cutting off all the current supplied thereto. This requirement is evidently somewhat at variance with that of the National Code, unless a remote-release type of switch is used. Such a switch has been designed and placed on the market by the A. G. Electric & Manufacturing Company, 905 Howard Avenue, North, Seattle, Wash.

As shown in Fig. 1, this switch is of the knife-blade type with strong springs for opening it when the electromagnet releases the latch. The switch may also be opened by hand by tripping the latch. A push-button or similar contact switch is all that is needed in the entrance; closing the release circuit permits the switch to open. The release magnet has two windings, one connected between one of the outer poles and the neutral or middle pole, and the other winding similarly connected on the other side. Either of these windings above will open the switch. Ordinarily both are energized. Should either side of the main supply circuit have its fuse blown this does not prevent the magnetic release of the switch.

Thus the switch acts not only as an ordinary service switch, but also as an emergency switch available to opening by firemen in case of fire. This is especially valuable in theaters and other large buildings where special hazards exist. Many of these switches have been installed in such places. In the Gaiety Theater in San Francisco one push-button in the entrance will open three large switches, and thus disconnect all three of the services to the building. The control button or switch is arranged so it cannot be tampered with, but used for emergency only. It does not mar a fine entrance as a large switch would. Being connected to the latter by small wires the cost of running the heavy service leads to the entrance is eliminated.

The A. G. Electric & Manufacturing Company has also placed on the market a new stage pocket and plug. Fig. 2 shows the pocket with its door open. The box, including its front door, is made of wrought iron, the door and front being of very heavy metal so as to withstand much more severe service than the cast-iron type. Fig. 3 shows the parts of the receptacle and plug for this outfit unassembled. This discloses the double-break feature, which operates to prevent a short-circuit in case any metal should get in. This is not at all probable, on account of the position which the plug has in the box, nevertheless it is an additional safeguard.

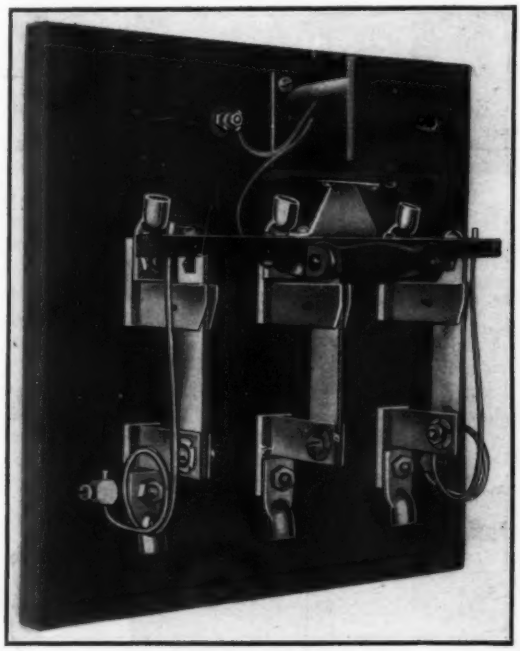


Fig. 1.—Service Switch With Remote-Controlled Release.

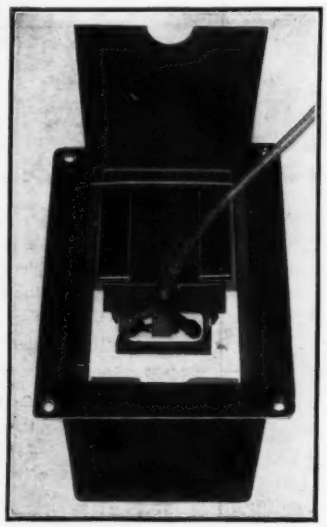


Fig. 2.—Stage Pocket.

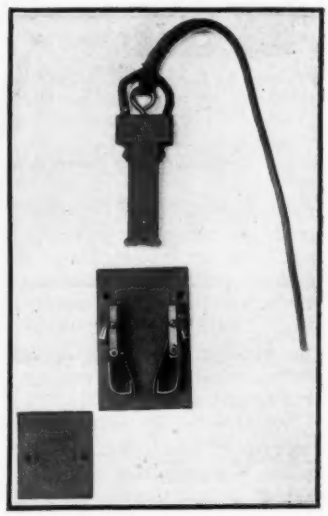


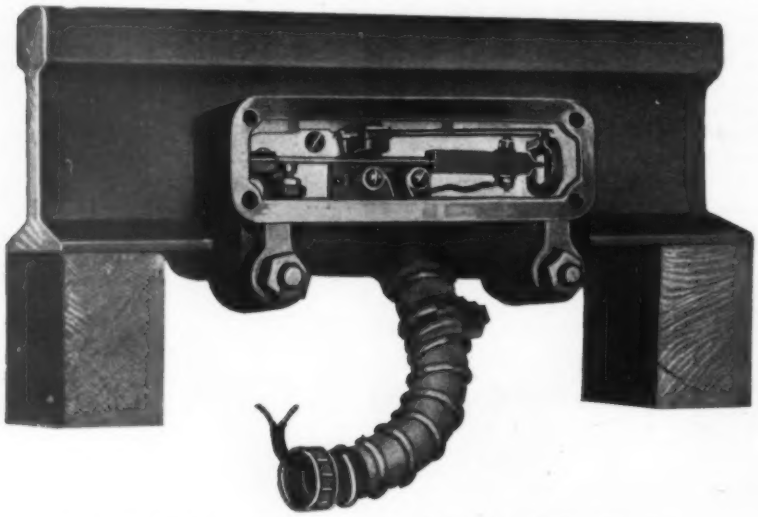
Fig. 3.—Parts of Receptacle and Plug.

Oscillating Circuit-Controller for Railway Signal Circuits.

There are many plans in railway signal work where it is necessary to have some reliable and yet simple device installed along the track so as to be actuated by the passage of a car or train, and thus control (either close or open) a signaling or indicating circuit dependent on the passage of the train over a certain point. This is the case in controlling highway-crossing signals, tower or station calls, tunnel signals, car counters, time and interlocking relays, light signals and other electric signals or indications.

Such a control device has been placed on the market recently. It is built on the oscillating or vibrating principle, and is of compact and rugged construction. The mechanism is entirely inclosed in a strong iron casing, which is secured to the side of the rail by two underslung rail clamps. The cover plate is held by four cap screws and with a gasket keeps out all moisture

and dirt. The vibrating contact is made between two platinum-iridium contact points, one of which is mounted below the end of a phosphor-bronze spring seen near the top of the casing in the illustration. The other contact is mounted on top of and near the end of a vibrating bob that is supported by a flat steel spring. The latter is adjustable for either normally closed or



Oscillator for Controlling Railway Signaling and Indicating Circuits.

open contact. The contacts, together with the entire electrical parts of the oscillator, are insulated from the casing and the entire mechanism can be readily screwed into or removed from the casing as a whole. The wires from the binding posts pass through a flexible conduit to the signaling or indicating circuit.

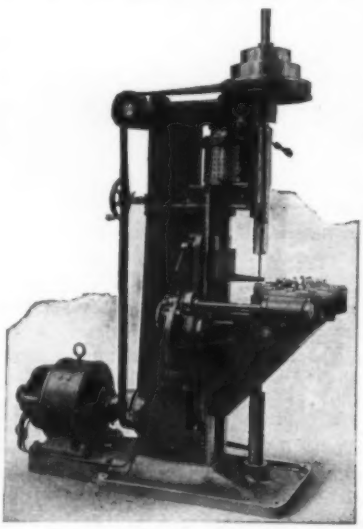
When a train passes over the rail section to which the oscillator is secured the vibrating bob is set into vibration and periodically opens and closes the circuit, thus actuating the crossing signal, annunciator, or other device. The action is positive, and very sensitive, even at low train or car speeds.

The oscillator can be utilized by both steam and electric railways, and does not affect, nor is influenced by any track signaling or power circuit, since the circuit controlled by the oscillator is a local circuit entirely insulated from the track rails. The oscillator can be quickly applied practically anywhere along the track, and does not get out of order even under the severest railroad service. It has been used by many important railway systems with complete success.

This oscillator is manufactured by the Protective Signal Manufacturing Company, Denver, Colo. The company also makes a line of electric signal gongs, relays, complete crossing signals, and accessories.

A New High-Speed, Heavy-Duty Drill.

The motor-driven drill shown in the accompanying illustration will drive three-inch high-speed drills to the limit of their capacity in steel. Six speed changes are provided; these are so arranged that but one pair of gears is in mesh at any time. One lever controls the six changes and they may be instantly made without stopping the machine. The starting and stopping lever is placed by the side of the gear-shift lever in such a manner that the machine may be slowed down without stopping it to secure smooth, noiseless shift.



Motor-Driven, High-Speed Drill.

Twelve feeds are provided. The feed rack is of steel and the feed pinion meshing with it is cut directly on the shaft. A large bronze worm gear, with provision for securing uniform wear, and a safety shear pin, to protect the feeding mechanism from abuse, is provided. The shear pin is set to shear at 11,000 pounds, and effectually protects the machine.

An automatic depth stop with fine adjustment is provided. A special pair of feed-change gears, which may be applied at any time without change, permits facing to an exact depth.

The machine is started and stopped by means of a shifting belt on tight and loose pulleys. The loose pulley runs on ball bearings. A spring device holds the belt securely on or off. In the off position a brake is applied in such a manner as to quickly stop the spindle and hold it effectually stopped. This not only saves time but is a safeguard to the workman while changing tools.

A 10-horsepower Westinghouse induction motor running at 1,200 revolutions per minute drives the machine. A line switch and an auto-starter with low-voltage protection are mounted on the side. The drill is manufactured by Baker Brothers, Toledo, O.

New Portable Lantern and Flash Lamp.

A simple and convenient form of electric lantern has been placed on the market by the Central Telephone & Electric Company, St. Louis, Mo. It employs any standard (No. 6) size of dry cell, which is held in a strong but light-weight metal case. Near the top of this is the lamp and reflector; a tungsten high-efficiency lamp is used to give long useful life to the cell. A switch for continuous or intermittent lighting is conveniently arranged. Two handles are provided; the bail is handy when the lamp is used as a road or pathway lantern; the rear handle is convenient when the outfit is used like a flashlight or dark lantern.

"Pract-El-Lite" Portable Lantern.

The company is also marketing a bicycle or buggy headlight of somewhat similar construction. This also takes any standard dry cell.

Current Electrical News

NORTH ATLANTIC STATES.

BURLINGTON, VT.—The sum of $50,000 will be expended for improvements on the municipal plant. Address city electrician.

MONTPELIER, VT. — The Ithiel Falls Power Company has been incorporated, with a capital stock of $150,000. The purpose of the corporation is to develop and manufacture electrical energy at a plant to be erected on the Lamoille River. The incorporators are Bancroft Abbott, Norwood, Mass., Charles H. Thompson, Montpelier, Vt., Benjamin A. Sumner, Montpelier, and Frank A. Walker, Barre, Vt. W.

MONTAGUE CITY, MASS.—The Amhurst Power Company, which is controlled by the Cabot interests of Boston, Mass., has let contracts for the construction of a 45,000-horsepower hydroelectric plant at Montague City, near Turners Falls. Work is to be started immediately, and an effort will be made to begin the installation of generating machinery by March 1, 1915.

RANDOLPH, N. Y.—On December 1, Messrs. Woodworth & Grace sold the Randolph Light and Power Company to G. M. Gest. The station is now being operated by representatives of Mr. Gest.

ALLENTOWN, PA.—The Lower Milford Township Electric Light and Power Company of Lower Milford Township, Pa., and the Lower Macungie Township Electric Light and Power Company, of Lower Macungie Township, Pa., have been granted charters to supply light, heat and power by electricity in those districts. The incorporators are: H. R. Fehr, Chas. N. Wagner and A. H. S. Cantlin, president, treasurer, and general manager, respectively, of the Lehigh Valley Light and Power Company.

EVANS, PA.—The School Board of this borough has awarded to the Allentown (Pa.) Electric Construction and Supply Company, the contract for the electrical construction in the new high school building.

LAURELTON, PA.—Plans are in progress for a one-story, brick, stone and concrete, power house to cost about $6,000. N.

MONACA, PA.—Plans are well under way for the town constructing a municipal light plant. President D. J. Mitchell reported recently that the matter had been discussed for some time by the members of the Council. An ordinance which was adopted by Council in September, 1901, provides that 15 years after date of the ordinance the town has a right to buy the plant of the Monaca Electric Company. This ordinance will be 15 years old about September 1, 1916. As the Monaca Electric Company has no plant in Monaca, the town would buy merely the equipment the companies maintain in Monaca, namely, their lamps, wires and poles. The town then would construct a plant and sell the current, furnishing the street lamps in the same way as at present, except that more lamps would be put up. S.

MT. UNION, PA.—This town has recently closed a contract with the Raystown Water Power Company, Raystown, Pa., for the installation of electric lighting on its streets. The contract calls for 400-candlepower and 100-candlepower nitrogen-filled lamps.

PAOLI, PA.—Plans have been completed for the erection of a one-story, brick and concrete, power house for the Pennsylvania Railroad. N.

SOUTH BETHLEHEM, PA.—Plans are now being formulated for the new high school building to be erected in this city, for which a bond issue of $185,000 was authorized at a recent election. It is said that the building will have an extensive electrical equipment. L. J. Broughal is chairman of the High School Committee of the School Board and D. J. McCarty is Superintendent of Schools.

SOUTH ATLANTIC STATES.

RICHMOND, VA.—A resolution has been adopted which instructs the city electrician to furnish the Administrative Board with an estimate of the cost of installing ornamental lights in Ginter Park, Fulton, those on various streets in the heart of the city and on the south side, and the extension of those on Broad Street. The board proposes to extend the lights on Broad Street westwardly from Laurel Street to the boulevard, and eastwardly from Twenty-third Street to Chimborazo Park.

WESTMINSTER, S. C.—D. B. Traxler, of Greenville, S. C., is contemplating the construction of a hydroelectric plant about three miles from Westminster, S. C. It is understood that 1,000 horsepower will be available, and that energy will be transmitted to Westminster, Walhalla, and Seneca, S. C.

NORTH CENTRAL STATES.

FREMONT, O.—County commissioners have granted the Ohio Light & Power Company a franchise to construct and operate lines for the furnishing of electricity throughout Sandusky County. It has been announced that the company is planning an immense central plant to furnish power for Fremont, Tiffin and Fostoria during the months that the new power houses in the three cities are not used to furnish electric power and Yaryan heat. The central plant will probably be built in Tiffin. H.

AKRON, MICH.—Akron is considering the advisability of putting in a new electric plant. Address town clerk.

CARLTON, MICH.—The council is planning ways and means to secure electric lighting. Address town clerk.

IOWA FALLS, IOWA.—New extensions of the high-tension line of the Iowa River Light & Power Company, which will provide electric light for the towns of Whitton and Conrad, are to be made this winter.

RUSSELL, IOWA.—The Union Service Company, of Chariton, will extend its lines to the corporate limits of Russell.

SCHLESWIG, IOWA.—The council plans to install a $15,000 light system. Address town clerk.

TIPTON, IOWA.—At a special election the voters decided in favor of municipal ownership of the electric light and power plant. Address town clerk.

JAMESPORT, MO.—Bonds amounting to $8,000 have been voted to install an electric light plant. Address town clerk.

GAYLORD, KANS.—The sum of $7,000 will be expended for municipal lighting. Address town clerk.

SOUTH CENTRAL STATES.

ELIZABETHTOWN, KY.—The Citizens' Lighting Company here has filed an amendment to its charter, increasing its capital from $3,000 to $5,000.

LEXINGTON, KY.—The projected "White Way," by which the downtown section of the city is to be lighted by two-lamp standards, has resolved itself into a definite proposition from the Lexington Utilities Company, and the City Commission is considering the proposal, waiting to make comparisons between 200-watt and 300-watt lamps before it makes a decision. There are to be 96 standards, erected along Main and Short Streets, to take the place of 16 arc lamps now used.

ARKADELPHIA, ARK.—The Arkansas Light & Power Company and the Arkansas Electric Light Company have surrendered their charters because their property and franchises have been sold to the Arkansas Power Company. H. C. Couch, of Little Rock, who is president of the new corporation, was president also of the two dissolved corporations.

DALLAS, TEX.—It is announced by F. G. Sykes, of New York, president of the American Power and Light Company, that its subsidiary, the Texas Power and Light Company, will expend from $500,000 to $1,000,000 in improvements to its power plants in this state and in the construction of power-transmission lines. The Southern Traction Company is closely allied with the American Power and Light Company and will obtain the power for operating its interurban lines between Dallas and Waco and between Dallas and Corsicana from the plants of the Texas Power and Light Company. D.

PARIS, TEX.—Work on the new plant of the Texas Power and Light

Company, which was suspended shortly after the outbreak of the war in Europe, will be resumed right away. The engineers of the construction company which has the contract for putting in the plant have already arrived. Employment will be given a number of men who have been out of work. Construction of the high wire line between Paris and Bonham will also begin at once. This line will furnish lighting facilities for intervening towns and for operating gins and other purposes.

VICTORIA, TEX.—The Texas Southern Electric Company will construct a power transmission line from its plant at this place to Cuero. D.

PUEBLA, MEXICO. — Ernest Jacobs, of Puebla, and associates plan to build a hydroelectric plant on the Rio de San Baltazar, in this state. They have made application to the Federal Government for a concession for the purpose. D.

WESTERN STATES.

MOGOLLON, N. M.—The Mountain States Telephone & Telegraph Company is preparing for the installation of an exchange in this city connecting with Cooney, Alma and other outlying districts of Socorro County.

PHOENIX, ARIZ.—The installation of new lighting standards on North Central Avenue has been ordered by the City Commission.

MONTESANO, WASH.—Plans for the new electric power plant to be built in this city by the Northwest Electric & Water Works Company are practically completed and preparations are being made to begin work of constructing the local plant and the large storage basin at Sylvia Lake. This company, at the present time, owns and operates an electric lighting plant and distributing system in this city, but the plant is to be doubled in size and the distributing system will be rebuilt and extended. Plans call for the construction of a steam power plant, capable of burning either wood or oil. R. J. Andrus is manager of the corporation. O.

TACOMA, WASH.—The city clerk has been authorized by the City Council to issue a call for bids for furnishing and installation of new luminous-arc lamps in the north end residence district. The proposition of removing all overhead wires on Union Avenue, South Tacoma, from Fifty-second to Fifty-eighth Street and install luminous-arc lamps is being considered.

BAKER, ORE.—The proposed $180,000 extension to the municipal lighting plant is to be submitted to the voters at a bond election to be held January 1. The municipal plant now in operation supplies but the street lighting and it is the intention of the City Commission to enlarge the present plant so that residence and business lighting can be taken over. O.

GOLD HILL, ORE.—The California-Oregon Power Company has been awarded the contract for installing a lighting system and furnishing current for a period of 10 years by the town council. The system will consist of 18 three-cluster lights, 35 single lights on wooden standards, 16 lights on iron standards and one large cluster of three lights at the bridge. O.

AUBURN, CAL.—Preliminary plans for a municipal lighting system, to be constructed and operated by the city of Auburn, are under contemplation by the City Board of Trustees.

CALIPATRIA, CAL.—The Chamber of Commerce is planning the installation of a street lighting system.

CUCAMONGA, CAL.—The Ontario Power Company has offered to install lamps from Base Line to the Santa Fe depot providing the city will sign a five-year contract.

FRESNO, CAL.—New specifications have been decided upon for the electrolier system which is to be installed throughout the business district.

SAN FRANCISCO, CAL.—The Exposition Company has been granted permission by city officials to use a lot at Grove and Polk Streets in the civic center as a site for a temporary power house which will supply power to the municipal auditorium.

SANTA MONICA, CAL.—The J. D. Keen Contracting Company has been awarded the contract for installing an ornamental lighting system on Colorado Avenue for $2,100.

STOCKTON, CAL. —Specifications have been adopted for the electroliers and street lights to be used next year, and bids are being taken.

WEAVERVILLE, CAL.—The California-Oregon Power Company has applied for a franchise to operate within Trinity County, and the supervisors have advertised for bids on such a franchise.

PROPOSAL.

ARC LIGHT CARBONS.—Sealed proposals will be received by the Commissioner of Gas and Electricity at his office, Room 614, City Hall, until December 24, for furnishing and delivering to the Department of Gas and Electricity arc light carbons for electric use, strictly in accordance with the specifications on file in the office of said official and in approximately the following quantities: 120,000 12-inch by 0.510-inch to 0.520-inch solid high grade carbons; 120,000 12-inch by 0.510-inch to 0.520-inch cored high grade carbons; 450,000 12-inch by 7/8-inch white flame carbons for flaming arc lamps; 10,000 pairs white flame carbons for Stave arc lamps. Address Ray Palmer, Commissioner of Gas and Electricity, Chicago.

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained by writing (mentioning file number) to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or to the nearest of its branchest at Boston, New York, Atlanta, Chicago, New Orleans, Seattle and San Francisco.]

NO. 14,774. ELECTRIC INCANDESCENT LAMP.—An American consul in the United Kingdom reports that a firm of manufacturers of special metals and drawn wire in his district is desirous of communicating with manufacturers of electric incandescent lamps, with a view to purchasing in considerable quantities.

NO. 14,782. RAILWAY SIGNAL SYSTEM.—An American consular officer advises that a railway company in the Far East is contemplating the installation of a system of block signals for double-track railway, complete with telephone system. It is desired to obtain this equipment from America.

NO. 14,785. TELEPHONE SYSTEM.—An American consular officer in the Far East advises that a railway company in his district is planning to install a new telephone system for a municipality. Firms interested in furnishing electrical supplies, etc., should send catalogs and price list.

NEW PUBLICATION.

THE NATIONAL ELECTRIC LIGHT ASSOCIATION PROCEEDINGS.—The National Electric Light Association proceedings of the thirty-seventh convention held at Philadelphia, Pa., June 1 to 5, 1914, have been issued in four volumes. One volume is devoted to the general sessions, including the executive sessions, public policy sessions and the company section sessions. Another volume is devoted to the commercial section sessions; another to the hydroelectric and transmission and technical sessions, and one complete volume is devoted to the accounting sessions.

NEW INCORPORATIONS.

BRIDGEPORT, CONN.—Olean Electric Contracting Company. Capital $10,000. Representative, Peter C. Schutrum, 37 Wall Street.

RICHLANDS, VA.—The Richlands Service Corporation has been incorporated with a capital of $25,000, to build electric and gas plants.

KINDERHOOK, ILL.—Farmers' Bluff Telephone Company. Capital $4,000. Incorporators: J. H. Kuhlman, George W. Lawrence, William Blanser.

FULGHAM, KY.—Fulgham Telephone Company; capital $5,000. Incorporators: John W. Beatick, John W. Bone, V. S. Vaden and P. R. Humphrey.

HOLMESVILLE, O.—The Brown & Harris Electric Company has been incorporated with a capital of $3,500, by S. C. Brown and others.

FULTON, TENN.—The South Fulton Light and Power Company has been incorporated with a capital of $2,000 by W. C. Morehead and others.

CHICAGO, ILL.—Acme Electric Portable Ventilating Company. Capital $2,500. Incorporated by E. Kasischke, Oscar Wolff and Harry A. Tiffany.

DOVER, DEL.—The A. W. R. Electric Manufacturing Company has been incorporated by Adolph P. Rosener, of New York, and is capitalized at $100,000.

CLYMER, N. Y.—Clymer Telephone Company, Incorporated. Capital $20,000. Incorporators: J. D. Gallup, Marion A. Keyes and Elmer Warnshouse, all of Clymer, N. Y.

BUFFALO, N. Y. — Flach-Berger Electric Construction Company, Incorporated. Capital $2,500. Incorporators: Edward R. Flach, George P. Berger and Albert A. Gaines.

CHICAGO, ILL.—Evanston Electric Company; house and garage business; capital $15,000. Incorporators: William Greenletch, Otto C. Dwors and H. J. Margraf.

HARRISBURG, PA.—A charter has been granted to the Pennsylvania Public Service Corporation to generate and distribute electricity. The company is capitalized at $500,000.

NEW YORK, N. Y.—Toll & Company has been incorporated to manufacture dental switchboards and other electrical apparatus. Capital $10,000. Incorporators: Spencer E. Toll, N. M. Toll, and K. H. Bissell, all of New York City.

CHICAGO, ILL.—M. Goldschmidt & Company; electrical motors, appliances, etc. Incorporators: Alexander Goldschmidt, Max Goldschmidt, Julius Phillips. Capital $2,500.

ANTIGO, WIS.—The Morley Telephone Company has recently been incorporated with a capital stock of $4,000. The incorporators are Edward Cleary, William Reader and W. B. McArthur.

FAIRWEATHER, WIS.—The Fairweather Electric Company has been incorporated with a capital of $25,000. The incorporators are John Laper, John O. Laper and Jesse W. Laper.

HOMER CITY, PA.—The Homer Light, Heat & Power Company has been incorporated with a capital of $5,000 by W. O. Hoover and others. The offices of the company will be in Clearfield, Pa.

CANTON, O.—The Everhard Manufacturing Company; electric appliances. Capital $10,000. Incorporators: C. H. Everhard, H. H. Everhard, E. P. Everhard, Edith Everhard, Linda Everhard.

PORTLAND, ME.—The Moulton Engineering Corporation. To carry on a general electrical, hydroelectric and hydraulic engineering business. Capital $50,000. President and treasurer, E. W. Freeman.

CHICAGO, ILL.—Lincoln Electric Heating Appliances Company, Incorporated. Capital $6,000; to manufacture and deal in general merchandise. Incorporators: Leo B. Lincoln, E. Hoffman, Carl A. Bentssen.

TAUNTON, MASS.—The Mowry Electric Company has been incorporated with $1,000 in 40 shares of $25 par value each. The incorporating directors are G. M. Leach, president; Berton T. Mowry, treasurer, and E. W. Lincoln.

FORT WAYNE, IND.—The Dudlo Manufacturing Company has been incorporated with a capital of $50,000, to manufacture and sell electrical supplies. Incorporators: W. E. Mossman, B. Paul Mossman, George A. Jacobs.

LOCUST GROVE, OKLA.—The Locust Grove Light and Power Company has been organized with a capital of $10,000. Incorporators: H. D. Long and A. W. Killam of Locust Grove and Thomas McCroskey of Webb City, Mo.

NEW YORK, N. Y.—The Metalyte Company, Incorporated. Manufacture electrical machinery, lamps, etc. Capital $500. Incorporators: Walter D. Wile and Edward Pfeffer, of New York City, and Lillian A. Schneider, of Brooklyn, N. Y.

NEW YORK, N. Y.—Carolina Central Electric Corporation, to deal in stocks, bonds, voting certificates of corporations, etc. Will carry on business with $30,000. Incorporators: K. W. Burden, L. Criscuolo, F. M. Van Wicklen.

GETTYSBURG, PA.—A charter has been granted by Governor John K. Tener to the Oxford Township Light, Heat and Power Company. The directors are Norman S. Heindel, J. Donald Swope and Raymond F. Topper of Gettysburg.

NEW YORK, N. Y.—The Lansden Company, Incorporated, to manufacture electric motor vehicles. Capital $1,000. Incorporators: Martin Lippman, Brooklyn, N. Y.; Emma Ullman, Jersey City, N. J., and Emanuel L. Meyer, New York, N. Y.

NEW YORK, N. Y.—The Leindorf Electric Light Company has been incorporated to do electrical work, general contracting, and to deal in fixtures, etc. The company is capitalized at $25,000. Incorporators: Emil Leindorf, Herman Trisch, Julius Katz.

POCATELLO, IDAHO.—Articles of incorporation have been filed for the Grande Canyon Canal & Power Company, with a capital stock of $200,000. The purpose of the company is to operate power plants, build electric transmission lines, irrigation canals, etc.

NEW YORK, N. Y.—National Safety Train Control & Signal Company, Incorporated; to manufacture electrical devices for signaling, etc. Capital $10,000. Incorporators are Napoleon B. Marshall and Nora Newsome, of New York, and Franklin W. Morton, of Brooklyn.

BIDDEFORD, ME.—The Freeman Electric Supply Company has been incorporated for the purpose of dealing in electrical supplies and fixtures and to install the same. Capital stock, $10,000. The incorporators are: President, Eugene J. Lavigne, Biddeford; treasurer, James R. Freeman, Saco.

BROOKLYN, N. Y.—B. Turcamo Contracting Company, general contracting, electric light and power supply work, construct and manage mills, factories, restaurants, etc. Capital, $5,000. Incorporators, Bartholdi and Marie Turcamo and B. Dalbora; attorney, W. S. Butler, 138 Montague Street.

NEW YORK, N. Y.—The Empire Lighting Company, Incorporated, has been formed with a capital of $25,000, to manufacture electric and gas fixtures, etc. The incorporators are Louis Schaffner, 1703 Washington Avenue, Bronx, New York, Irving B. Ansorge and Percy I. Ansorge of 1342 Forty-ninth Street, Brooklyn, N. Y.

AUGUSTA, ME.—The Santo Domingo Water, Light and Power Company has been organized for the purpose of purchasing, acquiring, owning and selling aqueducts and water works, and all dams and fixtures, with a capital stock of $1,000,000. The officers are L. J. Coleman, president; R. S. Buzzell, treasurer.

OGDEN, UTAH.—Grand Canyon Canal and Power Company has been incorporated for $20,000. It is the purpose of the company to develop hydroelectric power in eastern Idaho and western Wyoming. The officers are: Dr. S. W. Badon, president, C. H. Gosling, vice-president, Arthur Kuhn, secretary, R. E. Hoag, treasurer.

PHOENIX, ARIZ.—Articles of incorporation have been filed for the Machinery and Electrical Company with a capital stock of $50,000, by E. A. Trincano, C. E. Scrivner, F. W. Rich, and Reese M. Ling. The purpose of the company is to carry on a business of installing all machinery for electrical, gas, steam heating, ventilating, and lighting plants

DUBUQUE, IOWA.—Keller Electric Company. To deal in gas and electric fixtures, and in electrical machinery and apparatus. Capital $10,000, of which $5,000 has been paid in. Until next meeting C. H. Keller and C. E. Murphy will constitute the board of directors, and C. H. Keller shall be president and general manager; C. E. Murphy, secretary-treasurer.

FINANCIAL NOTES.

The Ohio Light and Power Company, a subsidiary of American Gas and Electric, has filed in the counties in which it operates a mortgage for $30,000,000 to secure an authorized issue of five-per-cent bonds of which a portion has already been sold to New York bankers.

The Kentucky Utilities Company, a subsidiary of Middle West Utilities Company, has sold to N. W. Halsey & Company, Russell, Brewster & Company and McCoy & Company $1,500,000 first-mortgage six-per-cent gold bonds out of an authorized issue of $3,000,000. The bonds are being offered on a seven-per-cent basis.

The Southern Power Company has sold $800,000 first-mortgage five-per-cent twenty-year bonds, due March 1, 1930, to Harris, Forbes & Company, National City Bank, and Perry, Coffin & Burr. Bonds are being offered at 97 and interest.

Carrying out the plan of consolidating all electric generating and distributing subsidiaries of Commonwealth Power, Railway & Light Company in Michigan, under the Consumers Power Company of Michigan, stockholders of Grand Rapids Edison Company, at a meeting held in Jersey City, voted to sell the property of the company to the Consumers Power Company, and also to dissolve the old company. Grand Rapids Edison was organized in 1902 and all its common and a majority of its preferred stock is owned by Grand Rapids-Muskegon Power Company, controlled by Consumers Power Company. There are $763,000 first-mortgage bonds outstanding, due in 1916, and these probably will be refunded by bonds of Consumers Power Company.

Dividends.

	Term.	Rate.	Payable.
Am. Cities, pf.	S-A	3%	Jan. 1
Am. Gas & Elec., com.	Q	2%	Jan. 2
Am. Gas & Elec., pf.	Q	1.5%	Feb. 1
Am. Gas & Elec., (extra—payable in com.)	—	2%	Jan. 2
Bangor Ry. & Elec.	Q	1.75%	Jan. 1
Bell Tel. of Canada	Q	2%	Jan. 15
Can. Westhse.	Q	1.75%	Jan. 11
Capital Trac.	Q	1.25%	Jan. 2
Consumers Pr. of Mich., pf.	Q	1.5%	Jan. 2
Ill. Trac.	Q	1.5%	Jan. 2
Memphis St. Ry., com.	—	2.5%	Dec. 31
New Orleans Ry. & Lt., com.	—	1%	Dec. 31
Niagara Falls Pr.	—	2%	Jan. 15
Penn. Water & Pr.	Q	1%	Jan. 1
Shawinigan Water & Pr.	Q	1.5%	Jan. 11
Standard Gas & Elec., pf.	Q	1%	Dec. 15
Twin City, com.	Q	1.5%	Jan. 2
Twin City, pf.	Q	1.75%	Jan. 2
United Lt. & Ry., 1st pf.	Q	1.5%	Jan. 1
United Lt. & Ry., 2d pf.	Q	0.75%	Jan. 1
United Util., pf.	Q	1.75%	Jan. 2
Western Union Tel.	Q	1%	Jan. 15

Reports of Earnings.

SOUTHERN POWER COMPANY.

Twelve months ended September 30, 1914:	
Gross earnings	$2,501,426
Operating expenses and taxes	1,103,763
Net earnings	1,397,662
Bond interest	290,000
Balance	1,107,662

DAYTON POWER & LIGHT COMPANY.

	1914	1913
October gross	$ 82,470	$ 72,713
Net	37,814	32,921
Surplus	20,412	16,149
12 months' gross	999,688	759,362
Net	438,191	307,622
Surplus	226,128	120,097

DETROIT EDISON COMPANY.

	1914	1913
October gross	$ 569,962	$ 495,719
Net	254,771	204,408
Surplus after depreciation reserve	123,181	94,244
Ten months' gross	5,151,080	434,124
Net	2,149,437	1,807,007
Surplus after depreciation reserve	1,006,202	814,134

CITIES SERVICE COMPANY.

	1914	1913
October gross	$ 300,211	$ 162,468
Net after expenses	289,821	153,709
Balance after interest	248,987	137,881
Surplus after preferred dividend	112,154	74,341
12 months' gross	3,940,940	1,649,877
Net after expenses	3,837,883	1,563,897
Balance after interest	3,441,216	1,499,168
Surplus after preferred dividends	*1,799,224	762,124

Accumulated surplus to November 1, 1914, $3,033,957.

*Equivalent to 11.45% on common stock.

WESTERN POWER COMPANY.

	1914	1913
October gross	$ 227,598	$ 224,893
Net	158,459	119,878
Surplus after charges	70,002	38,874
12 months' gross	2,686,747	2,662,298
Net	1,771,832	1,697,843
Surplus after charges	799,108	721,932

VIRGINIA RAILWAY & POWER.

	1914	1913
October gross	$ 446,704	$ 445,821
Net	234,389	231,753
Surplus after charges	107,619	105,093
Four months' gross	1,761,702	1,739,297
Net	914,812	890,545
Surplus after charges	399,002	390,292

PERSONAL MENTION.

MR. THOMAS F. BOYLE, of Boston, has been appointed a member of the Industrial Accident Board of Massachusetts by Governor Walsh.

MR. C. E. McKELVEY, of Mt. Union, Pa., has been appointed manager of the Western Union Telegraph Company at Mount Union, succeeding his father, J. R. McKelvey, deceased.

MR. JOHN H. ROEMER, chairman of the Railway Commission of the State of Wisconsin, will, on February 1, 1915, join the organization of H. M. Byllesby & Company, of Chicago, in charge of the extensive legal business of that organization and its allied interests. H. M. Byllesby & Company are engineers and managers of public utilities throughout the country from the Mississippi Valley to the Pacific Coast. Mr. Roemer has served on the Wisconsin Commission since the time its duties were enlarged to embrace the regulation of utilities other than steam railways in 1907.

MR. NORMAN B. HICKOX, until recently treasurer and manager of the Greenwood Advertising Company, Knoxville, Tenn., has accepted an executive position with the Thomas Cusack Company, with headquarters in Chicago. Mr. Hickox is well known in the electrical industry and is peculiarly fitted for his new position. He was previously engaged in the central-station business, having had charge of the commercial department of the Muskogee Gas & Electric Company for several years. He is a vice-president of the Electric Sign Manufacturers' Association and last year was statesman for Tennessee in the Jovian Order.

MR. HARRY W. ALEXANDER, publicity and sales manager of the Federal Light and Traction Company, New York, has resigned his position to become manager of the editorial and advertising section of the Society for Electrical Development. He will begin his new duties January 1, 1915. Mr. Alexander has had varied experiences in publicity and sales work. His first position was in the accounting department of the San Pedro, Los Angeles & Salt Lake Railroad, at Los Angeles. Later he was transferred to the passenger department, where he came in touch with advertising work. Some time later he became press representative of one of the large amusement holding companies, and for three years traveled for this corporation throughout the United States and Canada. He later acted as its resident agent at different times in Salt Lake City, Pocatello, Idaho, and Denver, Colo. In 1909 he entered the field of metropolitan journalism, starting with the Chicago *Inter Ocean*, where he successfully handled the departments of labor, finance, special engagements, politics, and public utilities. At one time he held one of the editorial staff positions. Finding public utilities to his liking, early in 1911 he became associated with the Federal Light and Traction Company's operating department, resigning a year later to go with the construction forces of the Kansas City, Clay County & St. Joseph Railway, an electric line then building between Kansas City and St. Joseph, Mo. Returning late in 1912 to the Federal company, he went in the sales department, and in May, 1913, became publicity manager. In this capacity he was first engaged to work toward effecting better public relations between the subsidiary companies and the local press and public. Later he was given charge of the sales department, which he handled in conjunction with the publicity department, preparing all of the advertising copy and handling the merchandise sales campaigns. This is the position he is leaving to become associated with the Society of Electrical Development. Mr. Alexander is a member of many prominent advertising clubs and press associations.

OBITUARY.

COL. E. D. MEIER, president and chief engineer of the Heine Safety Boiler Company, New York, N. Y., died on December 13. Colonel Meier became manager of the company in 1895, and was made vice-president in 1898. He became president and chief engineer of the company in 1911.

MR. EDWARD DAVIS, a consulting electrical expert and inventor, and at one time a member of the faculty of the Massachusetts Institute of Technology, died at the home of his daughter in Cambridge, Mass., December 11. He was a native of Nottingham, England, where he was born in 1840. His talent in electro-mechanics secured him an instructorship in the royal arsenal at Nottingham. He later came to America and entered the electrical department of Massachusetts Tech. He was engaged in special investigations for many large electrical companies, and was offered a place on the staff of Thomas A. Edison. A son and three daughters survive him.

DATES AHEAD.

American Association for the Advancement of Science. Annual meeting, Philadelphia, Pa., December 28, 1914, to January 2, 1915. Secretary, L. O. Howard, Washington, D. C.

Electrical Contractors' Association of Wisconsin. Annual meeting, Milwaukee, January 18-20, 1915. Secretary, Albert Petermann, Milwaukee, Wis.

Independent Telephone Association of America. Annual convention, Hotel Radisson, Minneapolis, Minn., January 19-21, 1915. Secretary, W. S. Vivian, 19 South LaSalle Street, Chicago, Ill.

American Wood Preservers' Association. Annual convention, Congress Hotel, Chicago, Ill., January 19-21, 1915. Secretary, F. J. Angier, Baltimore, Md.

Wisconsin Electrical Association. Annual convention and joint meeting with Wisconsin Gas Association, Hotel Pfister, Milwaukee, January 20-22, 1915. Secretary, George Allison, First National Bank Building, Milwaukee, Wis.

Western Association of Electrical Inspectors. Annual meeting, Hotel Radisson, Minneapolis, Minn., January 26-28, 1915. Secretary, W. S. Boyd, Chicago.

With the Electrical Manufacturers

American Electrical Works, Phillipsdale, R. I., has sent out its December price list covering its extensive assortment of electrical wires and cables.

The American Manufacturers' Agency, 111 Monroe Street, Chicago, W. H. McKinlock, president, announces that it has taken the agency of the Federal Electric Company, Pittsburgh, and will market its switch boxes, plates, conduit boxes and cabinets in the West and Northwest.

Delta-Star Electric Company, 617-631 West Jackson Boulevard, Chicago, Ill., has ready for distribution copies of a convenient reference card showing the reduced list prices of the S. & C. high-tension chemical fuses. The reverse side of the card shows many handy delta star and combination wiring diagrams.

The Nungesser Carbon & Battery Company, 1170 East Thirty-eighth Street, Cleveland, O., has published a symposium on the dry battery. This is one of the most interesting productions that has appeared in some time, and will be of interest to every electrical man. Copies of this symposium may be secured by application to the company.

Pfanstiehl Company, North Chicago, Ill., has been reorganized on an enlarged scale. This has greatly strengthened the company financially and made it possible to increase its

business steadily and carry it on more efficiently in every department. The company makes a variety of electrical specialties. Carl A. Pfanstiehl is president, and J. M. Troxel is secretary and treasurer.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has furnished and completed the installation of a 19,000-kilovolt-ampere, 6,600-volt, three-phase, 60-cycle turbo-generator for the West Penn Traction Company of Pittsburgh. The machine has been placed in commercial service and is one of the largest generating units in the Pittsburgh district. It materially increases the capacity of the Connellsvillle power house.

The Oshkosh Manufacturing Company, of Oshkosh, Wis., well known manufacturer of construction tools, announces that it has arranged to carry a complete stock of tools in New York City, with the Electric Operations Company, Bush Terminal, Brooklyn. This is done for the accommodation of the Oshkosh company's eastern customers, who cannot wait for shipments directly from the factory, and owing to the fact that the company's business has increased so remarkably during the past two or three years.

Smith & Hemenway Company, 153 Chambers Street, New York, N. Y., has published a "family album" containing pictures of about 1,000 Red Devil tools, which will be sent to anyone upon request. This line of tools has been designed with particular reference to the application of each tool, and the design has been such as to make it serve its particular purpose to the best advantage in each case. This line has been given the appellation "the mechanic's pet" on account of the high regard in which the tools are held by the American workman.

Robbins & Myers Company, Springfield, O., suffered considerable damage to its foundry and machine shop by fire on December 12. The electrical plant was not damaged in any way, and there will be no interference in filling orders for motors, generators, and fans. Arrangements have been made with adjoining manufacturers for the use of their foundries until the Robbins & Myers foundry can be rebuilt. The only delay will be that occasioned by transferring patterns from the company's plant to the adjoining foundries. Steps have been taken for the immediate construction of a new modern plant. The loss was entirely covered by insurance.

Record of Electrical Patents.

Issued by the United States Patent Office, December 8, 1914.

1,119,800. Electric-Current Controller. L. Bradley, assignor to Allen-Bradley Co., Milwaukee, Wis. Compression resistance unit mounted on lever.

1,119,809. Automobile Number-Displaying Device. H. Coogan, Detroit, Mich. Electrically lighted casing.

1,119,832. Switching Socket or Connector. G. C. Knauff, Chicago, Ill. Socket and plug for automobile lamp.

1,119,838. Electrical Heating Unit. F. Kuhn, Detroit, Mich. Resistance coil is wound through insulating board.

1,119,839. Electric-Terminal Box. F. Kuhn. Reversible closure.

1,119,840. Electrical Fluid-Heater. F. Kuhn. Tubular casing with coiled resistor.

1,119,841. Electrical Heater. F. Kuhn. Banjo-shaped support for element.

1,119,855. Electric Engine-Starter. M. P. Mitchell, Eaton, O. Worm-gear drive from motor to engine.

1,119,864. Electric Connector. E. J. Ovington and J. E. Herlihy, assignors to Simplex Electric Heating Co., Cambridge, Mass. Spring coupling with two socket tubes.

1,119,872. Electrode-Holder. H. J. Potts, Kansas City, Mo. Leaf-spring electrode clamp.

1,119,901. Hoist. A. C. Van De Velde, Chicago, Ill. Electric hoist with motor driving radial gear.

1,119,913. Electric Railway. G. Westinghouse; H. H. Westinghouse, C. A. Terry and W. D. Uptegraff, executors of said G. Westinghouse, deceased, assignors to Westinghouse Electric & Mfg. Co. Tunnel railway with electropneumatic sectionalizing circuit-breakers in closed chambers in the tunnel walls.

1,119,915. Service-Meter Circuit for Telephone-Exchange Systems. S. B. Williams, Jr., assignor to Western Electric Co. Special relay control.

1,119,923. Selective Switching Apparatus. A. M. Bullard, deceased; M. R. Bullard, administratrix, assignor to Western Electric Co. Controlled by selecting relay.

1,119,926. Electric Fuse-Igniter. S. Clark, Cottage Grove, Ore. Shell connected to ignition circuit.

1,119,928. Lamp Socket. J. Darby, Summit, N. J. Relates to pull-chain mechanism.

1,119,939. Trolley Wheel. F. L. Eager, Waterbury, Conn. Has special lubricant recess.

1,119,951. Rectifier. V. M. Harris, assignor to H. S. Hawley, Chicago, Ill. Commutator rotor revolves in oscillating field.

1,119,952. Transmitter for Wireless Communication. W. Harrison, New York, N. Y. Has a number of antennas spaced apart by integral multiples of their common wave length.

1,119,953. Block-Signal System. L. A. Hawkins, assignor to Union Switch & Signal Co. One rail is continuous for the power and signaling circuits, the other is sectionalized for signaling.

1,119,966. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Push-button switch with the buttons connected by a continuous helical spring in guide tube.

1,119,967. Adding Machine. H. Landsiedel, assignor to Dalton Adding Machine Co., Cincinnait, O. Automatic switch for driving motor turns off the power if machine runs idle for predetermined time.

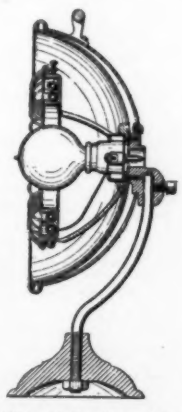
1,119,971. Circuit-Interrupter. H. G. MacDonald, assignor to Westinghouse Electric & Mfg. Co. Relates to mechanical features of release mechanism.

1,119,973. Lightning Conductor. L. L. Mast, assignor to D. H. Mast, West Milton, O. Clamp for connecting a branch to another lightning rod.

1,119,978. Trolley. W. E. Moore, assignor to R. D. Nuttall Co., Pittsburgh, Pa. Relates to trolley-pole elevating mechanism at base of pole.

1,119,987. Motor Controller. G. R. Radley, assignor to Cutler-Hammer Mfg. Co. Provides for changing the field windings from series to parallel.

1,119,988. Coil Support. L. Rapp, assignor to Westinghouse Electric & Mfg. Co. For holding both shunt and series field coils.



1,120,003.—Reflecting Heater.

1,120,001. Electric Lamp for Vehicles. K. H. Thompson, assignor to D. W. Cummins, Shelby, O. Special socket mounting.

1,120,003. Electric Heater. A. A. Warner, assignor to Landers, Frary & Clark, New Britain, Conn. Double-walled reflector with resistance unit surrounding a central lamp. (See cut.)

1,120,006. System of Electrical Distribution. J. L. Woodbridge, Philadelphia, Pa. Includes storage battery, booster and regulator.

1,120,018. Electric-Current-Controlling Device. L. Bradley, Milwaukee, Wis. Compressible resistance unit with heat-controlled means for automatically reducing pressure upon the resistance column.

1,120,025. Start and Stop Signal for Railroad Cars. R. H. Cartmell, Detroit, Mich. Automatic electric signaling from cars in an electric train to motorman in first car.

1,120,031. Emergency-Valve and Circuit-Breaker Trip. H. Cordell and J. G. Tawse, Chicago, Ill. Interconnection of air-brake system and motor circuit of electric motor cars.

1,120,040. Holding Device for Instruments. C. W. Dunham, assignor to Union Switch & Signal Co., Swissvale, Pa. Relay.

1,120,049. Telephone Apparatus. O. M. Glunt and E. C. G. Mueller, assignors to Western Electric Co. Hand telephone transmitter.

1,120,054. System for Signaling Through Space. W. Harrison, New York, N. Y. Has a number of aerials, each connected through a transformer with the oscillation detector.

1,120,057. Diaphragm Horn. M. R. Hutchinson, West Orange, N. J., assignor to Lovell-McConnell Mfg. Co. Motor-vibrated diaphragm.

1,120,064. Manufacture of Incandescent Lamps. E. Lambert, assignor to Westinghouse Lamp Co. Special method of joining the bulb to the filament stem.

1,120,074. Distributing and Measuring System for Electricity. M. R. Meikleham, New York, N. Y. Has both watt-hour meter and maximum-demand meter, the latter controlled by a separate time-regulated circuit.

1,120,077. Battery-Holder. G. L. Patterson, assignor to A. C. Patterson, New York, N. Y. Connected sockets assembled on a cabinet cover or shelf for screw-top dry cells.

1,120,084. Annunciator. F. C. Ries, Macon, Ga. A coil spring armature above each electromagnet.

1,120,086. Arc Lamp. A. C. Roebuck, assignor to Enterprise Optical Mfg. Co., Chicago, Ill. Special hand feed and adjustment.

1,120,110. Incandescent-Electric-Lamp Socket. A. Weber, Jr., assignor to Weber Electric Co., Schenectady, N. Y. Interconnection between cap, shell and body.

1,120,112. Timer and Distributer. W. D. C. Wright, Philadelphia, Pa. For internal-combustion-engine ignition.

1,120,140. Electrical System of Distribution. J. B. Entz, assignor to Electric Storage Battery Co., Philadelphia, Pa. Regulator for storage-battery booster.

1,120,148. Electrical System of Distribution. R. C. Hull, assignor to Electric Storage Battery Co. Counter E. M. F. and end cells with resistances for storage battery regulation.

1,120,160. Hanger for Arc Lamp. C. E. Pope and R. S. Phillips, Cleveland, O.; said Phillips assignor to said Pope. Has cutout automatically separated when lamp is lowered.

1,120,171. Note-Sheet for Electrical Musical Instruments. A. R. Trist, London, England. Has two conducting layers between insulating layers.

1,120,191. Apparatus for Electrolytic Production of Wire. W. E. Gibbs, assignor to Gibbs Co., Plainfield, N. J. The wire is passed from the depositing apparatus to the drawing apparatus and back to the depositing apparatus.

1,120,207. Selective Signaling System. O. T. Lademan, assignor to Morse Code Signal Co., Milwaukee, Wis. Step-by-step signal receiver at each substation controlled by impulses of opposite polarity.

1,120,210. Locking Switch. J. Maibaum, assignor to T. E. Murray, New York, N. Y. Locking bolt can be passed through blade.

1,120,212. Protective Device for Electric Circuits. A. V. A. McHarg, assignor to T. E. Murray. Fusion of a connecting bridge releases a knife switch.

1,120,214. Measuring the Quantity of Fluid Flowing Through Pipes. K. Metzdorff, Berlin-Tegel, Germany. Electrical indicating system governed by immersed resistances.

1,120,217. Electrical Measuring Instrument. F. W. Morris, assignor to T. E. Murray, New York, N. Y. Modified D'Arsonval ammeter with constant current in moving coil and varying magnetic field due to current in cable being measured and about which yoke piece is clamped.

1,120,220. Refrigerating Apparatus. T. E. Murray and A. W. H. Griepe; said Griepe assignor to said Murray. Has motor-driven compressor.

1,120,221. Electric Fuse. T. E. Murray, New York, N. Y. Knife-blade cartridge fuse with the fuse element mounted longitudinally on a removable carrier bar.

1,120,222. Electrically Controlled Cutout. T. E. Murray and A. V. A. McHarg; said McHarg assignor to said Murray. Spring switch lever is controlled by two electromagnets at right angles to each other.

1,120,223. Fuse Box. T. E. Murray. Special inclosing case for the plug.

1,120,224. Electric Bath-Cabinet. T. E. Murray. Walls are of fabric-joined plate sections.

1,120,225. Electric Cutout. T. E. Murray. Fuse plugs carried by switch levers.

1,120,226. Electric Fuse. T. E. Murray, Jr., assignor to T. E. Murray. Cartridge fuse with central blowing point inclosed in solid insulating material.

1,120,241. Electric Time Mechanism. S. G. Rhodes, assignor to T. E. Murray. Electrically actuated clock.

1,120,259. Resistance Unit. H. J. Wiegand, assignor to Cutler-Hammer Mfg. Co. Flatiron element with continuous resistance wire.

1,120,261. Translator for Printing-Telegraph Systems. J. E. Wright, assignor to Wright Telegraphic Typewriter Co., New York, N. Y. Has two sets of contact levers with a series of notched permutation bars controlled by selecting magnets.

1,120,293. Mail-Delivery System. K. J. Ekedahl, Chicago, Ill. Electrically propelled suspended car.

1,120,301. Distributer for Electrical Ignition System for Internal-Combustion Engines. E. Gassmann, assignor to Eisemann Magneto Co., Brooklyn, N. Y. Special connector for the cables and brush sleeves.

1,120,306. Magnetic Lift for Electrodes in Electric Oscillators. C. D. Herrold, San Jose, Cal. Solenoids with adjustable lift.

1,120,315. Magneto-Operating Mechanism. L. F. Kristufek, assignor to Brown & Mehlhope, Chicago, Ill. Coiled-spring link device between armature shaft and driving shaft.

1,120,345. Advertising Device. O. S. Thal, San Francisco, Cal. Balls run on electric runways.

1,120,354. Primary Cell. P. Young, assignor to Six in One Electric Battery Co., Detroit, Mich. Cathode is supported by binding-post stem.

1,120,355. Driving Gearing. C. E. F. Ahlm and C. E. Cochran, assignors to Elwell-Parker Electric Co., Cleveland, O. Motor-driven pinion engages internal gear on vehicle drive wheels.

1,120,356. Perforated-Tape Reproducer. C. G. Ashley, assignor to General Engineering & Construction Co., Ltd., Toronto, Ont., Canada. Includes relays, condensers and electromagnetic tape punches.

1,120,375. Clutch and Controller for Printing Presses. H. H. Cutler, assignor to Cutler-Hammer Mfg. Co. Magnetic clutch.

1,120,376. Alternating Current Motor Controller. W. E. Date, assignor to Cutler-Hammer Mfg. Co. Induction-motor starter with fixed and adjustable secondary resistances.

1,120,377. Blower for Sound-Producing Devices. G. B. Dusinberre, assignor to R. S. Mueller & Co., Cleveland, O. Has sleeve valve actuated by solenoid for controlling the exit of air.

1,120,382. Switch. B. Haskins, assignor to Allis-Chalmers Mfg. Co. Multipolar oil switch.

1,120,384. Spark Plug. N. J. Hoag and H. E. Vosburgh, Skaneateles, N. Y.; said Vosburgh assignor of one-third to said Hoag. Includes a heating coil.

1,120,399. Sparking Device for Explosive Engines. J. D. Maxwell, Tarrytown, N. Y. Relates to drive of ignition magneto.

1,120,414. Automatic Reciprocating Electro-Magnetic Motor. F. E. Schoolfield, Covington, and J. C. Owen, Bellevue, Ky. Plunger reciprocated by and between two solenoids.

1,120,459. Condition Indicating Mechanism for Signaling Systems. H. W. Doughty, assignor to G. O. Knapp, New York, N. Y. For fire-alarm system.

1,120,472. Electrical Junction Box. E. H. Freeman assignor to E. H. Freeman Electric Co., Trenton, N. J. Sectional box with connecting lugs and keepers in the edges of the wall plates.

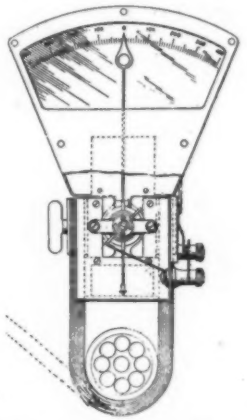
1,120,475. Purification of Gases. E. L. Hall assignor to Security Savings & Trust Co., Portland, Ore. Comprises subjecting a combustible gas to the influence of a silent high-tension discharge.

1,120,492. Electric Lamp. S. M. Hino, Rock Springs, Wyo. Tungsten lamp with three sets of filaments, one within another.

1,120,493. X-Ray Tube. I. S. Hirsch, New York, N. Y. A cooling and filtering fluid surrounds the bulb.

1,120,499. Electric Signaling Device. A. S. Huckins, Philadelphia, Pa. Electromagnetically controlled indicator.

1,120,517. Device for Protecting Telegraph and Like Lines Against Inductive Action from Neighboring Circuits. O. Moll and P. Kuschewitz, County of Kent, England. A transformer with primary connected to the disturbing system and secondary connected to the telegraph line, the secondary being shunted by a variable capacity and resistance.



1,120,217.—Cable-Testing Ammeter.

1,120,547. Stop-Motion Device. L. von Sazenhofen, Nuremberg, Germany. Electric stopping mechanism for printing machine.

1,120,554. Connector for Battery-Terminals and Other Electrical Conductors. A. H. Snyder, assignor to Gould Storage Battery Co., New York, N. Y. Lead-covered bolt connector.

1,120,560. Automatic Regulating Apparatus for Electrical Precipitation Systems. W. W. Strong, assignor to R. B. Mellon, Pittsburgh, Pa. Electrostatic dust and smoke precipitation with a selenium cell for detecting changes in intensity of radiation due to variations in density of suspended matter.

1,120,561. Art of Separating Finely Divided Particles of Solids or Liquids from a Gas. W. W. Strong and A. F. Nesbit, assignors to R. B. Mellon. Precipitation process using high-potential, high-frequency, oscillatory discharge.

1,120,572. Electric Locomotive. C. J. E. Waxbom, assignor to Jeffrey Mfg. Co., Columbus, O. Mining locomotive with propelling motor and separate motor for driving a haulage-cable reel and an electric-conductor-cable reel.

1,120,577. Device for the Interruption of the Projection of Kinematographic Pictures. C. C. A. E. Wiese, Hamburg, Germany. Includes a film-operated circuit-closer controlling a shutter.

1,120,579. Baseball Game Apparatus. R. Williams, Washington, D. C., assignor of one-half to M. Burt. Has a number of illuminators for lighting a screen fabric.

1,120,586. Circuit-Closer for Electric Railways. A. W. Barnhart, assignor to Electric Undercurrent Co., Pennsboro, W. Va. Surface-contact box with induction magnets for connecting the contact plate with line.

1,120,589. Vehicle Safety Signal Light. F. O. Bean, Somersworth, N. H. Two electric tail lamps controlled by movement of steering rod.

1,120,605. Telephone System. W. W. Dean, assignor to Garford Mfg. Co., Elyria, O. Interconnection of ringing key and supervisory relay.

1,120,606. Party-Line Telephone System. W. W. Dean, assignor to Garford Mfg. Co. Modification of above.

1,120,613. Burglar-Alarm Window-Lock. L. L. Grove, St. Louis County, Mo. The circuit is closed when the lock bolt is moved.

1,120,615. Alternating-Current Motor. V. M. Harris, assignor to H. S. Hawley, Chicago, Ill. Synchronous motor with automatic means for adjusting field position.

1,120,616. Motor Starter. V. M. Harris, assignor to H. S. Hawley. For synchronous motor; has means for intermittently connecting the field at a speed corresponding to that of the rotor.

1,120,618 and 1,120,619. Diaphragm Horn. M. R. Hutchison, assignor to Lovell-Mc Connell Mfg. Co. Electric motor vibrates the diaphragm.

1,120,623. Supervisory Alarm System. J. G. Nolen, assignor to Automatic Fire Protection Co., New York, N. Y. Includes electric resistance arranged so as to heat a portion of the conduit locally.

1,120,627. Alarm Horn. W. Edwin Russell and W. Earl Russell, assignors to Lovell-McConnell Mfg. Co. Motor-operated.

1,120,648. Electric-Trolley-Line Construction. L. S. Boggs, assignor to Westinghouse Electric & Mfg. Co. Trolley conductors form a V-shaped junction.

1,120,653. Alarm Horn. W. Edwin Russell and W. Earl Russell, assignors to Lovell-McConnell Mfg. Co. Motor-driven ball strikers.

Patents Expired.

The following United States electrical patents expired December 14, 1914:

595,293. Electric Railway. J. R. Farmer, St. Louis, Mo.

595,325. Electric Meter. W. D. Marks, Philadelphia, Pa.

595,327. Electric Lighter for Burners. S. M. Meyer, Brooklyn, N. Y.

595,329. Means for Generating Electricity from Car-Wheel Axles. M. Moskowitz, Newark, N. J.

595,330. Electric Regulator. M. Moskowitz.

595,343. Blind Raised or Lowered by Means of Electricity and Solar Rays. E. Roth, Osnabruck, Germany.

595,344. Controlling Device for Electric Motors. F. J. Russell, New York, N. Y.

595,345. Electrical Controlling Mechanism. F. J. Russell.

595,364. Space-Block for Armature Cores. A. F. Batchelder, Schenectady, N. Y.

595,367. Joint for Electric Cables. W. M. Brown, Johnstown, Pa.

595,375. Electric Signaling Apparatus. W. E. Decrow, Boston, Mass.

595,395. Rheostat or Electric Heater. F. Kraemer, Chicago, Ill.

595,398. Electric Alarm Device. F. Louis, Brooklyn, N. Y.

595,402. Conductor for Electrical Apparatus. J. Millis, U. S. Army.

595,403. Transformer. W. S. Moody, Lynn, Mass.

595,409. Electric Railway-Motor. E. D. Priest, Schenectady, N. Y.

595,410. Electric Motor. E. D. Priest.

595,412. Regulating Alternating-Current Dynamo-Electric Machines. E. W. Rice, Jr., Schenectady, N. Y.

595,413. Braking Alternating-Current Induction Motors. E. W. Rice.

595,419. Method of and Apparatus for Converting Electric Currents. E. Thomson, Swampscott, Mass.

595,420. Electric Arc Lamp. E. Thomson, Swampscott, and E. Harthan, Lynn, Mass.

595,446. Prepayment Attachment for Electric Meters. J. Strachan and J. Niven, Saginaw, Mich.

595,570. Controlling Device for Electric Railways. R. M. Hunter, Philadelphia, Pa.

595,575. Electric Signal-Indicator. M. Mercier, Manchester, England.

595,580. Secondary Battery. P. F. Ribbe, Berlin, Germany.

595,585. Fuse Block. D. A. Schutt, Peru, Ind.

595,590. Electric Railway System. M. J. Wightman, Scranton, Pa.